

COMBAT SUPPORT

This chapter describes the organization, capabilities, and employment considerations of CS elements in the LID that may be provided to or operate in close proximity to light armor forces. It will also discuss the CS organizations organic to the light armor battalion. When light armor elements are task organized to light infantry TFs, CS will come as part of the normal infantry battalion or brigade. In some instances the infantry headquarters may task organize CS units to a light armor company team. In other instances the LID may task organize CS elements to the light armor battalion when it operates as a battalion TF.

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Section I. Indirect Fire Support

FS is the collective and coordinated use of indirect-fire weapons, armed aircraft, and other lethal and nonlethal means in support of a battle plan. Lethal FS includes mortars, field artillery (FA), air-delivered weapons (discussed in [sections II](#) and [III](#)), NGF, and ADA used in its secondary role. Nonlethal means include illumination, smoke, and EW. The force commander employs these means to support his scheme of maneuver, to mass firepower, and to delay, disrupt, or destroy enemy forces in depth. Indirect FS planning and coordination exists at all echelons of maneuver. This section will discuss indirect FS. The indirect FS system supporting light forces is the collective body of—

- Command, control, and coordination facilities and personnel.
- Target acquisition and battlefield surveillance.
- Indirect FS weapon systems.

An FA battalion is normally placed in DS of a light infantry brigade. The brigade commander will give priority of fires to selected maneuver elements during each phase of the battle based on his scheme of maneuver. The FS system supporting the light armor battalion TF consists of the same basic components as those that support a tank battalion. The light armor battalion has a dedicated FSE, but light armor elements are normally task organized and FA support usually received through the parent infantry TF.

Attack system assets are allocated to the light armor battalion as priorities of FS based on the division or TF commander's guidance and scheme of maneuver. Besides indirect FS, attack system assets could include CAS and FASCAM.

The light armor maneuver commander uses FS to enhance his combat power by—

- Destroying, suppressing, and neutralizing targets.
- Obscuring the vision of enemy forces.
- Isolating enemy formations and positions.
- Slowing and canalizing enemy movements.
- Killing or disabling the enemy at ranges greater than direct-fire weapons capability.
- Screening with smoke or isolating areas with scatterable mines.
- Reducing the effect of enemy artillery by active counter fire.
- Interdicting follow-on threat echelons.

The maneuver commander must decide what effect FS must have on a particular target. The three target effects categories are—

- Destruction. Destruction puts a target out of action permanently. Direct hits are required to destroy hard material targets. Usually, destruction requires large expenditures of ammunition and is not considered economical. A casualty rate of 30 percent or more will normally render a unit ineffective.

- **Neutralization.** Neutralization temporarily knocks a target out of action. It does not require an extensive expenditure of ammunition and is the most practical type of mission. Most missions are neutralization fire. A casualty rate of 10 percent or more may neutralize a unit.
- **Suppression.** Suppression of a target limits the ability of enemy personnel in the target area to perform their jobs. The effects of these fires usually last only as long as the fires are continued. Suppression requires the least amount of ammunition; however, since its effects are not lasting, it is unsuitable for some targets.

To take advantage of the effects of FS, the light armor leader must know the planned target effect and synchronize his maneuver plan to maximize the M8's shock effect and firepower capabilities.

ORGANIZATION

Battalion FS Organization. The battalion FSO is the fire support coordinator (FSCOORD) for the maneuver battalion. He is in charge of the FSE and is the principal FS advisor to the maneuver commander. The FSE, located with the operations element of the maneuver forces, may include—

- The FSO (captain).
- The FS plans/targeting officer (lieutenant).
- The FS sergeant (sergeant first class).
- The FS specialist (specialist).

When added to the FSE to perform their FS functions, other representatives serve as a functional FS team to enhance FS coordination. These representatives may include—

- S3 -Air.
- Mortar platoon leader.
- Battalion NBC officer.
- TACP.
- Supporting arms liaison team (SALT).
- Air defense officer.
- Other representatives (such as engineer, allied force, and Army aviation liaison personnel).

FIRE SUPPORT PLANNING AND EXECUTION

FS planning procedures at the light battalion TF level are essentially the same as those in armored battalions. When the light armor battalion operates as a unit and priority of artillery fires is given to the battalion, the FSO must consider the following during planning:

- Assigned tactical mission of FA units.
- Number and caliber of artillery units in support.
- Range capabilities, including special munitions and rocket-assisted projectiles (RAP).

- Effects of available munitions and quantity on hand.
- Locations of primary and future positions.
- Size of the PPF.
- Radius of burst.
- Maximum and sustained rates of fire.
- Target acquisition for both external and organic internal assets.

Planning Considerations. Effective FS depends on centralized planning and decentralized execution and coordination. FS planning is a continuous process of analyzing, allocating, and scheduling. It determines how FS is used, what types of targets are attacked, when they are attacked, and with what means. The goal is to effectively integrate FS into battle plans to optimize combat power. To do this, FS planning is concurrent with battle planning. Planning must be flexible to accommodate the unexpected in combat and to facilitate rapid change. It anticipates factors like massing of FS assets, changes in force mission, realistic movement times, resupply, target acquisition, replacement of entire units, and technical support, including survey and meteorological requirements. The FSO must consider three vital sets of information: relationship of the commander's intent for maneuver and FS to other operating systems; factors of METT-T; and guidance from higher FA and maneuver headquarters. He must remember these factors cannot be considered individually. Each affects the others.

Process. FS planning begins with the commander's guidance and intent. It continues through the development of a prioritized list specifying what targets are to be attacked and when (decide), the acquisition of those high pay-off targets (detect), and the determination of attack options to be used (FS, maneuver, EW, or a combination) to defeat the target (deliver). It concludes with the assessment of the effects of the attack.

Commander's Intent. At each level, the FSO plans fires as the commander outlines his scheme of maneuver. The FSO must seek and understand the commander's guidance and intent and be prepared to make recommendations for the integration of available FS. He must know when and where the commander wants FS and what the commander wants in the way of effects, duration, and timing. To understand the commander's intent, he must also understand why and how unit direct fire assets are to be employed so he can supplement, not interfere with, their employment. Also, the FSO must ensure that he knows how FS is to be integrated with other operating systems and how to synchronize his plan to complement their employment. The FSO is responsible for informing the commander of all changes to the FS plan received through FS channels.

METT-T. Information is continuously analyzed at all levels of command considering the factors of METT-T (see Figure 7-1).

Mission.

- What is the mission?
- What is the commander's concept of the operation, scheme of maneuver, and concept for FS?
- What is the commander's intent?

Figure 7-1. Factors of METT-T.

- What is the objective of the operation?
- What route is the unit using?
- What are the intermediate objectives?
- What are the missions of higher, lower, and adjacent units?
- Are there any contingency missions?

Enemy.

- What are the enemy's capabilities and limitations in the unit zone of action (such as FS assets, direct-fire weapons, and vehicle mobility)?
- What are likely enemy COA?
- Where are known, suspected, and likely enemy locations?
- How does the enemy employ his forces (artillery, patrols, FOs, attack helicopters)?

Terrain and weather.

NOTE: This category includes observation, cover and concealment, obstacles, key terrain, and avenues of approach (OCOKA), as well as weather.

- What is the best use of terrain reinforcement as a combat multiplier?
- What is observation like in sector?
- Are cover and concealment available in sector?
- Where are obstacles (man-made and natural) in sector?
- Where is the key terrain?
- Where are likely positions for ambushes, LPs/OPs, and EAs?
- Where are the assembly areas?
- What is the weather forecast, and how will it affect mobility and visibility?
- How does terrain affect mobility, both friendly and enemy?
- What kinds of munitions are best suited for the terrain and weather?
- Are appropriate FS coordination measures tied to terrain, when applicable?

Troops available.

- What is the status of FSO/FS cell training, experience, personnel, and equipment?
- What FS assets are available, and what are their locations and capabilities?
- What is the status of the supported unit?
- What is the status of the observers in sector (such as FOs, combat observation lasing team [COLT], and scouts)?

Figure 7-1. Factors of METT-T (Cont).

Time available.

- How long before the operation begins?
- How much time is available to develop a fire plan?
- How long will it take to coordinate the fire plan?
- How long is the operation expected to last?

Figure 7-1. Factors of METT-T (Cont).

Guidance from Higher Headquarters. Higher headquarters will give the FSO information essential to the FS plan, including—

- The commander's intent at that level.
- FS assets available.
- FS coordinating measures.
- Target lists.
- Schedules of fires.
- Technical advice on FS matters.
- Constraints on FA Class V controlled supply rates (CSR).

Fire Planning and the Decision-making Process. The decision-making process is as detailed, or as simple, as time permits. The commander plays the central role in this process, with the staff providing advice and information related to their respective areas. The process is primarily downward, beginning at higher echelons and progressing downward to the company FSO. Its effectiveness requires continuous interaction and bottom-up feedback.

When the maneuver commander receives his mission and issues his initial planning guidance, the corresponding FSO receives guidance from the higher FSO. As a minimum, this guidance should cover the following:

- FS asset allocation and status.
- Commander's target attack guidance.
- Fires planned by higher headquarters in your zone.

Deliberate Fire Planning. Deliberate fire planning is conducted through a formal top-down process, with bottom-up refinement as time permits. It starts at all levels immediately upon receipt of the mission. Its foundation is the military decision-making process based on detailed interaction with other staff members. The decide-detect-deliver methodology assists in the development of a fire plan that is integrated and supports the scheme of maneuver. The battalion FSO should not wait for a target list from higher headquarters before beginning his own planning. He is responsible for identifying the battalion FS requirement with the commander, operations officer, and primary and special staff. He does this by receiving the fire plan and targets from the brigade FSO, modifying targets as necessary, and recommending targets of concern to the battalion commander. Using the target list worksheet and overlays as tools, he forwards his list of targets to subordinate FSOs.

The company FSO and company commander plan targets to support the company scheme of maneuver. From the battalion, the company FSO receives targets that are within the company area of interest. He modifies them as necessary and adds any other targets as according to the maneuver commander's priorities. Modifications and additions are submitted through the battalion to the brigade FSO for inclusion in the final brigade target list and fire plan.

At the lowest level, the company FSO nominates targets in his sector, records this target information on the target list work sheet, and forwards it to the battalion FSO. The battalion FSO considers the target information he receives from each of the company FSOs, consolidates it, adds targets needed by the battalion, and forwards a copy of the target list work sheet to the brigade FSO. The brigade FSO receives target lists from the battalion FSOs. Using a target overlay, he resolves duplications, adds targets developed by the brigade target acquisition assets, prioritizes the list, and sends it to the DS battalion. He informs the battalion FSOs of any subsequent changes to the plans. Once targets are received by battalion and/or brigade FSOs, they prepare their fire plans and schedules to support the maneuver and allocate targets to the appropriate FS agency or asset.

Quick Fire Planning. The purpose of quick fire planning is to rapidly prepare and execute FS in anticipation of an impending operation. It is the brigade FSO's responsibility to ensure the DS battalion S3, FDC, and battalion FS cells understand the quick FS plan and how it is used. Quick fire planning techniques constitute an informal fire plan. In the quick fire plan, the FSO is responsible for identifying targets to be engaged in the target list, allocating all FS assets available to engage the targets in the plan, preparing the schedule of fires, and disseminating the schedule to all appropriate FS agencies for execution. The following steps are used in the quick FS planning sequence:

- Receive the OPORD. The key is understanding what the commander wants. Obtain the following decisions from the commander:
 - Targets to be engaged.
 - Desired effects on targets.
 - Order and timing of target engagement.
 - Duration of fires.
 - H-hour.
 - Priority of fires.
 - Priority of targeting.
 - Priority of execution.
 - Other FS assets available.
 - Time check from commander.
 - Estimated rate of movement.
 - Need for target adjustment.
 - Concept of the operation, including objective and defensive positions; maneuver control measures; and obstacles.
- Find out what assets are available for the operation. Concurrently, send a WO to all attack agencies. These may include the FA battalion S3, mortar platoon leader, air liaison officer (ALO), naval gunfire liaison officer (NGLO), SALT-Air, and aviation LO (if any are applicable).

- Obtain from the FA DS battalion the firing units that will be designated to fire in the quick fire plan schedule.
- Obtain from the maneuver commander availability of the mortar platoon (company FSO to battalion FSO for mortars in a company operation) for inclusion as firing units in the schedule of fires.
- Obtain tactical air (TACAIR) mission information from the FS cell. Coordinate CAS requirements with the ALO (such as aircraft type, ordnance, time on station, laser codes, and control procedures).
- Obtain the availability of naval aircraft and/or NGF from the firepower control team, SALT-Air, or NGLO.
- Plan targets in accordance with the scheme of maneuver, commander's guidance, and allocated assets, determining—
 - Assets to be used.
 - Munitions mix.
 - Shell/fuze combinations.
 - Duration of fire for each target.
 - Time to fire.
- After receiving the commander's approval, disseminate the fire plan to attack systems, higher headquarters FSE, and those who will implement the plan (FOs and subordinate FS teams). Whenever possible, send DA Form 5368-R (Quick Fire Plan) to the FA battalion CP and mortar platoon leader.
- Ensure that subordinate FSOs and FISTs understand the fire plan. As a minimum, cover—
 - Positions/locations of FSOs and FOs during the conduct of the operation.
 - Who is to initiate the fire plan or the fire request for specific on-call targets within the fire plan. The plan should include the agency to be contacted, when the target is to be initiated, and the communications net to be used.
 - Which unit has priority of fires and what the priority targets are, if applicable.
 - The use of methods of control in modifying the plan should it become necessary during execution.
 - The agencies that are available when additional targets of opportunity arise during execution of the plan.
- Inform the commander when the plan is ready. Review the plan and modify it as necessary. If time allows, conduct a rehearsal to ensure comprehension of the plan.

FS Planning and Execution Matrix. The FS planning and execution matrix is a concise, easy planning tool that shows the many factors of a complicated FS plan. It can help the FSO and the commander to understand how the fire plan supports the scheme of maneuver. It is a valuable planning tool for both the offense and the defense. It explains what aspects of the FS plan each FSO and FO is responsible for and at what phase during the battle these aspects apply. When approved, the matrix becomes the primary execution tool. It is set up with the maneuver elements along the left side and different phases of the mission (PLs,

events, or times) along the top. Phases should correspond to phases established on maneuver execution matrixes (see Figure 7-2). At battalion level, the following considerations apply:

- If priority of any indirect FS means is allocated to a team, it is indicated by an abbreviation of that FS asset in the upper left corner of the appropriate matrix box.
- If an FPF has been allocated, the abbreviation FPF, preceded by the type of indirect fire means responsible for firing the FPF, will appear in the center of the box.
- If a priority target is allocated to a team, it will appear in the box as a priority target (PRI TGT), preceded by the means of FS responsible for firing the target. Once a target is determined as the PRI TGT, the corresponding target number is placed in the box.
- If a company FSO is responsible for initiating specific fires, the target number, group, or series will be listed in the box for that FSO. Specific guidelines concerning the target not included on the target list work sheet will be included in the box.
- If an airspace coordination area (ACA) is to be put in effect by a particular FSO, the abbreviation ACA, followed by the area code word designated for that ACA, will be shown in the box. The time the CAS or attack helicopters are due in the area is also listed.
- Other factors that apply to certain teams during a specific time frame may also be included in the appropriate box. General guidance is issued in the written portion of the OPORD.

	AA	CP 7	LD/LC	PL RED	PL BLUE	PL GREEN
TEAM TANK	FA FPF	FA PRI TGT CB 3002	FA PRI TGT GROUP C38		MORT SERIES FINISH	MORT MORT FPF
TEAM B	FA FPF	MORT B	MORT B MORT PRI TGT C83008	MORT MORT A PRI TGT C83125 MORT B PRI TGT C83225		FA FPF
TEAM C	MORT FPF	MORT A	MORT A MORT PRI TGT C83010	FA FA GROUP C68		FA FA FPF
TF CONTROL		FA GROUP C48 SERIES JOE	ACA ORANGE TGT 0800	ACA APPLE TGT 0815	FA GROUPS C78, C88, C98 ACA RAISIN TGT 0900	

Figure 7-2. Battalion fire support planning and execution matrix.

COMPANY FIRE SUPPORT

FIST Organization. FIST personnel are the company FSO (lieutenant), FS sergeant (staff sergeant), FS specialist (specialist), and radiotelephone operator (private first class). In infantry companies, the FIST may contain FO parties, each with an FO (sergeant) and a radio operator (private first class). Armor companies have no platoon FOs. The FIST depends upon platoon leaders to assist in the execution of fires to support the plan.

Company FSO. The company FSO is the maneuver company FSCoord and integrates all fires to support the commander's scheme of maneuver. Although he is not the primary shooter for the company, the FSO must be an expert at locating targets and adjusting fires. His duties are to—

- Plan, coordinate, and execute FS.
- Advise the company commander on FS matters.
- Keep key personnel informed of pertinent information (such as spot reports and SITREPs).
- Train the FIST platoon leaders in applicable FS matters.
- Request, adjust, and direct all types of FS.
- Ensure the FS plan and matrix is disseminated to key personnel and that a FS rehearsal is conducted.
- Allocate FOs for surveillance of targets.
- Provide emergency control of CAS missions in the absence of qualified USAF personnel, such as the ALO, the enlisted terminal attack controller (ETAC), or the airborne forward air controller (AFAC).

FS Sergeant. The company FS sergeant is the senior enlisted assistant to the company FSO. He acts as the FSO when required. He is responsible for the supervision and training of all enlisted section members and the maintenance and employment of their equipment. The company FS sergeant must be able to perform all duties of the FSO.

Company FSO Relationships. The company FSO works closely with the company commander, who is ultimately responsible for FS. The company FSO gives recommendations and advice to the commander on all FS matters; therefore, he is the maneuver unit expert. Final decisions regarding company FS rest with the company commander. The company FSO goes with him to receive plans and orders. The FSO must understand the scheme of maneuver as well as the company commander does. On the basis of the commander's guidance and war-gaming, the FSO devises his FS plan, which must be presented to the commander for his approval.

Company FSOs work for the battalion FSO. The battalion FSO provides guidance, battlefield intelligence, information on FS assets, FS coordination measures, and technical advice to the company. The battalion FSO coordinates and clears FIST fire missions that fall outside company boundaries of the requesting company FIST. Company FSOs provide updated friendly and enemy battlefield information to the battalion FSO. This information includes the forward line of own troops (FLOT) location, SITREPs, spot reports, other essential elements of friendly information (EEFI), and information relating to PIR. The battalion FSO helps the battalion commander train company FSOs.

The company FSO should locate himself where he can best support the company. Since the MS has a three-man crew, the company FSO will operate from the commander's

HMMWV when necessary. Maneuver companies should have an SOP specifying where the FSO will locate in the company headquarters during tactical operations.

As company FSCoord, the FSO obtains the following information from the battalion FSO:

- Status and location of FS delivery systems that the company may use.
- Status of TACAIR missions and TACP CAS control personnel (ALO/ETAC/AFAC).
- Existing targets, scheduled fires, and known points.
- FS coordination measures in effect.
- Verified frequencies and call signs.
- Status of COLTs, if available.
- Availability of position location assets, position azimuth determining system (PADS), or survey to accurately find minefield or obstacles.

The FSO obtains a mission briefing from the company commander, including—

- The scheme of maneuver and commander's intent.
- Location of platoons, crew-served weapons, and listening posts/observation posts (LP/OP).
- Current enemy situation.
- Status and location of obstacles.
- Location of FPF.
- MOPP level.
- Air defense status.

As a minimum, the FSO provides the following information at the company order briefing:

- FS plan for the operation, including responsibilities for its execution.
- Existing targets, scheduled fires, and known points.
- FS coordination measures for the operation.
- Status of priority fires.
- FS assets available to support the operation, with their location and status.
- Verified frequencies and call signs.
- Availability of position location assets.
- Status of FIST personnel and equipment (including Classes I, III, and V supplies).

The FSO ensures that communications are established with FS assets, such as artillery and mortars; with FOs, including COLTs, if applicable; with the battalion FSO; and with the maneuver commander.

Company FS Planning. Planning at the lowest level in the deliberate fire process, company level, begins with receipt of the TF order. The order contains the FS annex, which includes the higher headquarters' targets in the TF sector, targets added by the TF commander to support his plans, and specific guidance for employment of mortars. Company

commanders are responsible for positioning primary observers, establishing secondary or backup observers, and establishing trigger points for calls for fire. Key personnel must understand their priority of fires within the TF, TF priorities within the brigade, and when and under what conditions priorities will change. Targets are planned according to the planning allocation provided in the TF order. The TF FSE provides at least one high-quality acetate target overlay to each company so that planning can begin immediately upon receipt.

At first glance, planning responsibilities at company level might appear to be slight. This is not the case. It is at this point in the planning process that the requirement for detail is most critical. Assisted by target area survey, if necessary, company FSOs must ensure that the actual grid to target and the trigger point are visible to the observer or will be visible given the expected conditions of smoke, night operations, or position within the formation during offensive operations. Each observer must understand the communications plan as well as the backup plan in case the primary observer is unable to complete the mission. All members of the FS team, platoon leaders, and key NCOs must be drilled on all aspects of the plan.

At the lowest level, the company FSO nominates targets in his sector, records target information on the target list work sheet, and forwards it to the battalion FSO. The battalion FSO evaluates target information from the company FSOs, consolidates it (eliminating duplication, for example), adds targets needed by the battalion, and forwards a copy to the DS battalion fire direction center (FDC) and the brigade FS cell. The brigade FSO receives targets from the battalion FSOs. Using a target overlay, he resolves duplications, adds targets developed by brigade target acquisition assets, prioritizes the list, and transmits it to the DS battalion. He informs the battalion FSOs if there are any subsequent changes to their plans and transmits the brigade target list. When targets are received at battalion or brigade, FSOs at those levels prepare their fire plans and schedules to support the maneuver and allocate each target to its appropriate FS agency or asset.

Company Level FS Execution Matrix. The company level FS execution matrix shown in [Figure 7-3](#) includes the following information:

- Priorities of indirect FS to a platoon are indicated by an abbreviation of that FS asset and recorded in the upper left corner of the appropriate matrix box.
- The abbreviation FPF, preceded by the type of indirect fire means responsible for firing the FPF, is in the center of the box.
- PRI TGTs allocated to a platoon are recorded in the box as PRI TGT, preceded by the means of FS responsible for engaging the target and followed by the target number.
- If FIST elements are responsible for initiating specific fires, the target number, group, or series designation is listed in the box for that FIST element. Specific guidelines concerning fires not included on the target list work sheet will be included in this box.
- FS coordination measures to be in effect, followed by a word designated for that measure, are shown in the box. For ACAs, the time that planned CAS or attack helicopters are due on station is listed.
- Other factors that apply to a certain platoon during a specific time frame may be included in the appropriate box. General guidance is issued in the written portion of the OPORD.

	AA	LD/LC	PL WELLINGTON	PL JACKIE	OBJECTIVE
1st PLT	105FPF		MORT PRI TGT AC1212		3
2d PLT	105FPF	MORT	X		2
3d PLT			FA PRI TGT AC1234	Series PIANO	1
A	B	C	D	E	

Figure 7-3. Company level fire support execution matrix.

FIELD ARTILLERY

The FA mission is to destroy, neutralize, or suppress the enemy by cannon, rocket, and missile fire and to help integrate all FS into combined arms operations. Normally, one FA battalion is in DS of a maneuver brigade. However, more artillery battalions can be assigned the mission to reinforce the DS battalion.

Advantages. The advantages of FA are that it—

- Adds depth to the battlefield. The FA can strike and destroy the enemy in depth before he can influence the battle.
- Offers various ammunition and fuze combinations.
- Gives continuous fire in all weather conditions, day or night, and from all types of terrain.
- Shifts and masses fires quickly.
- Is as mobile as maneuver forces. Artillery for LID, airborne, and air assault divisions is towed.

Disadvantages. The disadvantages of FA are that it—

- Is an area fire weapon. In some cases, however, point targets can be destroyed by using guided or homing FA projectiles. These projectiles are expensive and limited in quantity. They must be used only against high-payoff targets.
- Has a limited ability to survive enemy ground, air, and artillery attacks. Weapons can be detected because of their large signature from communications and firing. Therefore, artillery must displace periodically.

- Is not well suited for use in direct fire mode.
- Has limited ability to bring timely and accurate massed fires on moving targets without detailed coordination and planning.
- Must be observed fire to be effective.

Organization. The division commander normally places at least one FA battalion in DS of a committed maneuver brigade. Additional FA units may reinforce DS battalions and/or provide GS reinforcing fires to the brigade based on availability and priorities of the division battle. The organization of a DS FA battalion is shown in Figure 7-4.

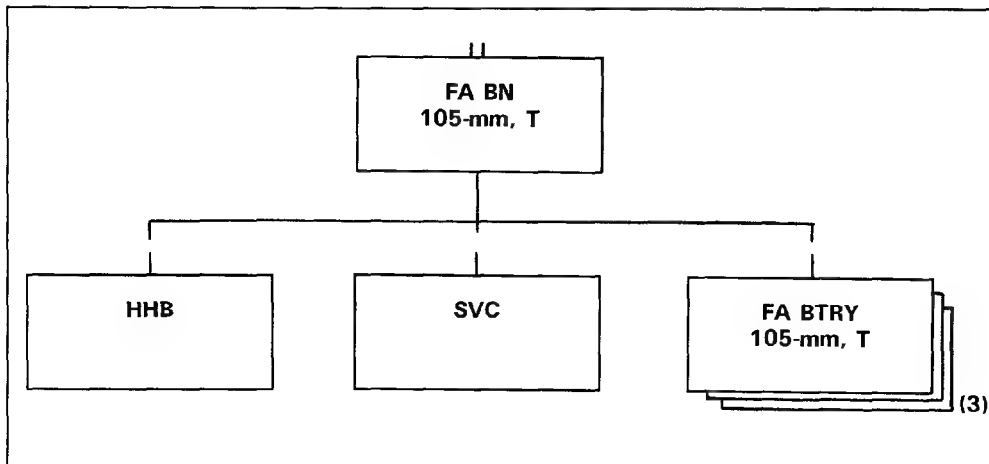


Figure 7-4. Direct support artillery battalion.

Positioning. The DS artillery battalion deploys and locates the main CP, combat trains, and each firing platoon and firing battery headquarters based on METT-T. Often these batteries will be in separate locations (split battery operation). The field trains normally operate in the BSA to increase its responsiveness. The following considerations apply:

- The maneuver commander must allocate sufficient position areas for all artillery units operating in his zone of action. Primary, alternate, and supplementary positions must be allocated throughout the zone for all units of the artillery battalion to synchronize their movement with the scheme of maneuver. The FA battalion commander is responsible for positioning his units, but he needs a general area and guidance from the brigade S3. Artillery units generally require firm ground, a good internal road network, defilade, cover, concealment, and defensibility. FA may not always operate with split batteries; often, a battery headquarters will be with a platoon.
- Depending on the tactical situation and terrain, an FA unit will move much like maneuver units. If enemy contact is not likely, it may move in column or wedge formation. If contact is probable, battery-size units will move independently, but movement will be coordinated so that one battalion or battery can provide FS to the maneuver force while another is on the road. Finally, if contact has occurred or is very likely, artillery units can move either by bounding or infiltration by battery, platoon, or individual gun.

CHARACTERISTICS

The characteristics of US FA and mortars are in Table 7-1. The characteristics of US FA and mortar smoke are in Table 7-2. The characteristics of US FA and mortar flares are in Table 7-3.

Table 7-1. United States artillery and mortar capability.

TYPE WEAPON	MINIMUM RANGE (METERS)	HE MAXIMUM RANGE (METERS)	MAXIMUM RANGE RAP (METERS)	MAXIMUM FPF WIDTH (METERS)	WEIGHT (POUNDS)	RATE OF FIRE (ROUNDS/MINUTE)	
						MAXIMUM	SUSTAINED
60-mm mortar (lightweight) M224	70	3,500	NA	2 tubes 75 x 30	45	30	15
81-mm mortar M29A1	70	4,790	NA	140 x 40	96	20	8
81-mm mortar improved M252	80	5,600	NA	4 tubes 150 x 50	93	36	15
107-mm mortar HE M329A1	920	5,650	NA	120 x 40	672	18	3
HE M329A2	770	6,840		3 tubes			
120-mm mortar (M57, M68, M91 M933, M934, M928, M930)	200	7,200	NA	360	80	15	4
105-mm (M119)		14,000	15,100	210 x 35 btry	4,000	10 3 min	3 30 min
105-mm (M102)		11,500	15,100	210 x 35 btry	3,170	10 3 min	3
105-mm (M101A1)		11,000	14,500	210 x 35 btry	4,980	10 3 min	3
155-mm (M114A1/A2)		14,600	19,400	300 6 gun btry	12,700	4 3 min	1
155-mm SP (M114A1/A2/A3) (M109A6)		18,100	23,500	200 pltn 400 btry	53,900 (55,000 A2/A3)	4 3 min	1
155-mm (M198)		24,000	30,000	300 btry 6 gun	15,800	4 3 min	2 30 min
203-mm (M110A2)		22,800	30,000	240 pltn 480 btry	62,100	1.5 3 min	0.5
MLRS (M270)	8,000	30,000	NA	NA	54,800	12	(Rockets)

- NOTES: 1. Maximum and sustained rates can be maintained only for the number of minutes listed.
 2. For charge 8, sustained rate is 1 round/minute for the first 60 minutes, 1 round/3 minute thereafter.
 3. May vary; cannon tube has a thermal warning device.

Table 7-2. United States artillery and mortar smoke capability.

DELIVERY SYSTEM	TYPE ROUND	TIME TO BUILD EFFECTIVE SMOKE	AVERAGE BURNING TIME	AVERAGE OBSCURATION LENGTH (METERS PER ROUND)		
				WIND DIRECTION		
				Cross	Quartering	Head/Tail
155 mm	WP	1/2 min	1-1 1/2 min	150	75	50
	HC	1-1 1/2 min	4 min	350	250	75
105 mm	WP	1/2 min	1-1 1/2 min	75	60	50
	HC	1-1 1/2 min	3 min	250	175	50
107 mm	WP	1/2 min	1 min	200	80	40
81 mm	WP	1/2 min	1 min	100	60	40
60 mm	WP	1/2 min	1 min	75	60	40

NOTE: All rounds are fired as standard missions with parallel sheets under favorable conditions.

Table 7-3. United States artillery and mortar illumination capability.

TYPE	RATE OF DESCENT (FEET PER SECOND)	BURN TIME (SECONDS)	RATE OF CONTINUOUS ILLUMINATION (ROUNDS PER MINUTE)	AREA ILLUMINATED (METERS)	CANDLE-POWER
107-mm/ M33SA2	12	80	2	1,500	850,000
105-mm/ M314	30	80	2	1,000	480,000
155-mm/ M485	18	180	1	2,000	1,000,000
81-mm/ M301	18	80	2	1,200	750,000
60-mm	19	25	4	800	250,000

MORTARS

Mortars are the only organic indirect FS asset in the light armor organization. Mortars provide responsive high-angle fires that can kill the enemy, suppress enemy fires, and conceal the movement of friendly forces. Mortars are best suited for immediate suppression and smoke. Mortars are most lethal against enemy light infantry. For the light armor leader, mortars can be extremely beneficial when the M8's direct-fire weapon systems cannot engage enemy light infantry due to masking terrain. Mortars are extremely important in the FS plan, especially in operations other than war. The FSO's doctrinal responsibility is limited to recommending the integration of mortars into the FS plan. For considerations of mortar employment, refer to FM 7-90. The FSO is concerned with the following areas.

Characteristics and Capabilities. The light armor battalion mortar platoon consists of six M252 81-mm mortars (two sections with three mortars each). The mortars are ground-mounted and carried in an M998 HMMWV. When planning mortar fires, the FSO must consider the high rate of fire and ammunition availability. A mortar platoon can fire over 300 rounds in less than 5 minutes. As a result, the ammunition supply can be quickly exhausted.

Command Relationships. There may be situations when the mortar platoon cannot support all of the battalion while remaining under battalion control. This may occur when a maneuver unit is given a mission that separates it from its parent unit. In those situations, a platoon or section may be placed under OPCON or attached to the supported unit, based on the following considerations:

- **Priorities.** The commander may specify support by assigning priority of fires and/or PRI TGT(s) to a subordinate unit.
- **OPCON.** This gives a commander the authority to direct forces provided to him to accomplish specific missions, usually limited by function, time, or location. The commander controls the tactical employment, movement, and mission of the mortars. He is not responsible for A/L support.
- **Attachment.** This temporary relationship gives the commander receiving the attachment the same degree of C2 as he has over units organic to his command. The commander selects the general location of the attached mortar element and controls its deployment as well as its fires. He is also responsible for logistical support and security of the mortars. Attachment is appropriate when units are assigned independent missions.

Tactical Employment. The commander has three options when considering how to employ the battalion mortar platoon. It can be employed by platoon, section, or squad. Usually the mortar platoon is employed as a platoon in the defense and in sections or squads in the offense. Squads consist of one mortar and its crew. Squads can be grouped together into sections. Finally, the entire platoon may be employed together. Selected options are based on the commander's guidance, METT-T, and priority of fires. The FSO must be prepared to advise the commander on which option to use. When employing mortars, the FSO must consider the following:

- Mortars are best at employing smoke and illumination fires.
- Mortars are most effective against soft-skinned targets.
- Their high-angle trajectory makes mortars effective against targets that are masked or in defilade.
- High-angle fires are easily detected by enemy radars.
- High-angle fires are adversely affected by strong winds.
- Mortar positions are seldom surveyed, creating the need for more adjustments and a loss of surprise when attacking targets. This can be overcome by requesting FA survey support or ensuring each position has a global positioning system.
- Mortars are effective in built-up areas (BUAs).
- METT-T must be considered when employing mortars. General positioning guidelines are as follows:
 - In the offense, one-half to two-thirds of the maximum range should be in front of lead elements.
 - In the defense, one-third to one-half of the maximum range should be in front of the lead elements.

- Positions should be selected to minimize the number of moves required.
- The mortars must be able to displace rapidly and provide continuous support.

Platoon Employment. The platoon operates from one or two firing positions and fires as one unit. The best way to position the platoon is to place the platoon sections in two separate locations at least 300 meters apart. The actual distance is based on the terrain, the ability to cover the sector, and limits in C2. A platoon located in a single area enhances C2 and local security but is more vulnerable to enemy counterfire. Fire direction centers (FDC) are trained to mass fires from separate locations onto a single target.

Section Employment. This places each section as a separate firing unit. The mortar platoon is normally employed by section to cover wider frontages. Each section is positioned so it can provide fires within the zone of action of the supported maneuver element. When employed by section, each section has an FDC or a computer. Depending on the range to target and separation of sections, more than one section may be able to mass fires on the same target.

Squad Employment. This places one or more mortar squads on the battlefield as separate firing units. This is usually done to support special requirements, such as—

- One-mortar illumination missions.
- Roving mortar adjustments.
- Antiarmor ambushes.
- Support for a very wide front.
- The maneuver element being required to cover a large front.
- Rear combat operations to support critical installations.

Displacement. It is essential that mortars displace rapidly and maintain their flexibility to provide continuous FS. Based on the scheme of maneuver, the mortar platoon leader develops a displacement plan. This is a map overlay with initial positions, subsequent positions, routes between the positions, and any control measures in effect. The following are considerations for selecting displacement techniques.

- By platoon—
 - The need for speed outweighs the need for immediately available fires.
 - This method may be used when contact with the enemy is unlikely.
 - Accurate and timely response to a call for fire is sacrificed; therefore, greater reliance is placed on “hip shoots.”
 - C2 problems are minimal.
- By section—
 - Continuous, accurate fires are required.
 - Speed is essential.
 - C2 is more difficult.
 - This method is slower than displacement by platoon.

- By individual squad—
 - The need for continuous fire outweighs need for speed.
 - C2 is extremely difficult.
 - This the slowest displacement technique.

Movement. Two movement options are available: successive bounds and alternate bounds. Generally, alternate bounds are used when displacement is rapid to keep up with support elements. Successive bounds are used when the maneuver element movements are not so rapid. Normally, the mortar platoon leader controls the bounds; however, if the tactical situation demands the decision to move to be based on multiple maneuver units, the FSO in close coordination with the battalion S3, will control bounds. Movement is conducted as follows:

- Successive bounds. A portion of the platoon moves to the next position. After that portion is in position and ready to fire, the rest of the platoon moves to the same position.
- Alternate bounds. A portion of the platoon moves to the next position. After that portion is in position and ready to fire, the rest of the platoon moves to a different position. This method applies to both the offense and the defense.

Integration of Mortars into the FS System. Mortars are an important part of the FS system. Based on the commander's guidance, the FSO must maximize their effectiveness through planning, coordination, and integration into the FS system and battle plan, as described in the following discussion:

- Tasks. The following tasks are inherent in planning, coordinating, and integrating mortar fires into the plan:
 - Develop target lists and plan fires based on the commander's guidance, and develop attack criteria to support the BOS.
 - Allocate priorities of fires and FPF.
 - Develop FS coordination measures to facilitate target engagement and safeguard friendly personnel.
 - Update target lists, priorities, and planned fires; and send them to the mortar FDCs.
 - Update operational status, location, and ammunition status of fire units.
 - Keep the mortar platoon updated on the tactical situation; include it in the orders process.
- Fundamentals. The following basic considerations apply to mortar integration:
 - Mortar fires are usually effective at providing smoke (white phosphorus [WP]); illumination; area fire; antipersonnel fire; fire to force armor to button up; fire in BUAs; and intense FPF on dismounted enemy.
 - Mortars are generally not effective at providing the following types of fires; therefore, other FS means should be used if possible: point destruction missions; armor destruction; and missions against well-protected defensive positions. If mortars are used to accomplish these missions, ammunition expenditure will be prohibitive.

NAVAL GUNFIRE

NGF provides large volumes of responsive, immediate and accurate FS to light armor and infantry forces operating on land- near coastal waters and to amphibious operations within their range. Normally, naval fires are controlled by an NGLO attached to the FSE for a specific operation.

Organization. NGF in any US Army unit is coordinated through the ANGLICO. The ANGLICO is a Marine organization that consists of three brigade air/NGF platoons organized and equipped to plan, request, coordinate, and control NGF and naval air. Figure 7-5 shows the organization of the ANGLICO. Each brigade has two SALTs that are normally attached to maneuver battalions. The SALT consists of two officers and six personnel, who become part of the unit's FSE. The SALT has two firepower control teams (FCT) which may be provided to maneuver companies to request, observe, and adjust naval FS. The SALT officers coordinate all NGF and supervise the activities of the FCTs. In addition, they advise the FSCoord on all matters pertaining to NGF employment.

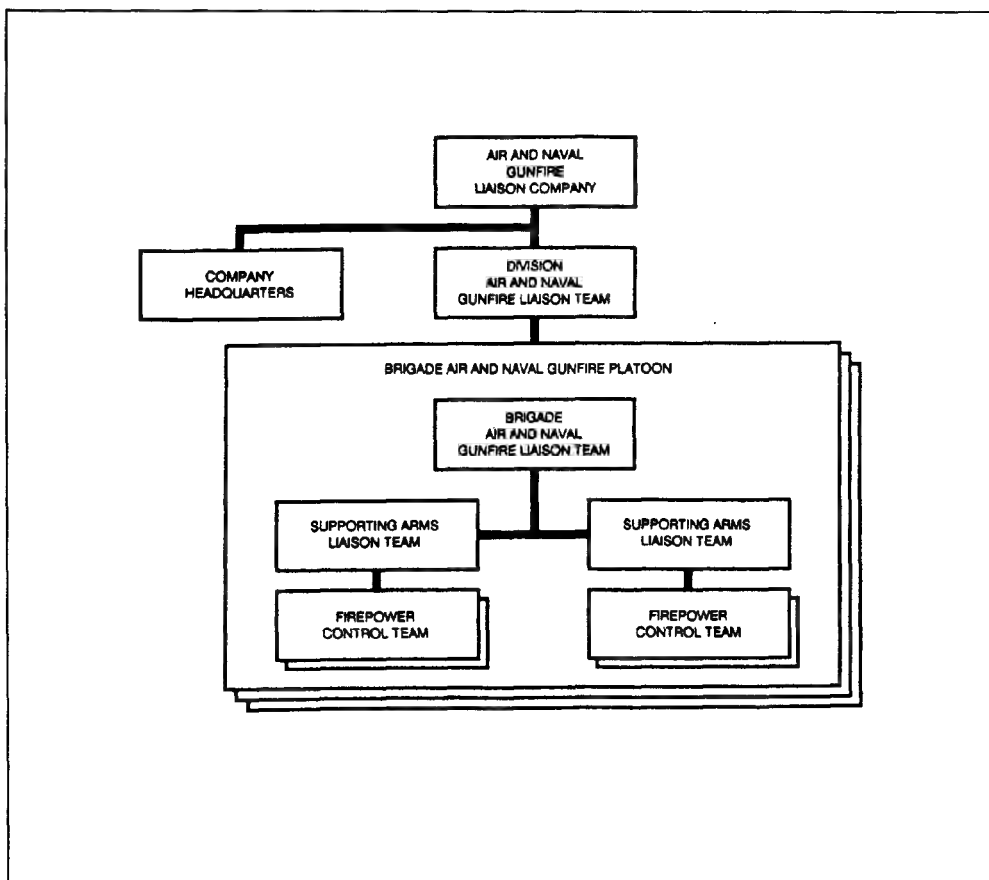


Figure 7-5. Air and naval gunfire liaison company organization.

Coordination and Planning. The NGF liaison team of the brigade operates on the division NGF support net high frequency (HF). This net provides communication between the division naval gunfire officer (NGO), the brigade NGLO and the ships in support of these units. This net is used for the day-to-day planning between units. Requests for FS are transmitted to the air and NGF team (at brigade or division), which forwards it to the ship. The NGO at division monitors and/or coordinates as necessary. This coordination is much the same as for FA engagement. When a light armor battalion or company is task organized to an infantry brigade, the SALT requests FS through the NGLO at brigade. When the light armor battalion operates separately, the SALT must contact the NGO at division. It does this using the FSO's communication means; the SALT does not have direct communication with the NGLO/NGO.

When NGF is available but ANGLICO personnel are not available, units may request NGF through the FS net to the division, where the NGO should be located with the division FSE. To increase response time for adjustments, Army personnel may interface with the NGF unit if the following equipment is available:

- NGF ground spotter net (frequency 2-30 MHz HF).
- Compatible equipment
 - Army: GRC-106, GRC-193.
 - USMC: PRC-104, GRC-193, MRC-138.
 - Air Force: PRC-104, MRC-107/108, GRC-206.

Characteristics. A complete understanding of the characteristics, capabilities, and limitations of NGF is essential to its successful use in ground support. [Table 7-4](#) depicts the FS characteristics of naval ships used to support ground combat.

Capabilities. Capabilities of NGF include—

- The variety of munitions and fuzes, including HE and illumination, permits selection of optimum combinations for the attack of targets. Ammunition may also consist of precision-guided munitions.
- The high muzzle velocity and flat trajectory make the naval gun suitable for direct fire or assault fire, particularly against reinforced targets such as bunkers and hardened positions.
- Some naval guns have a very high rate of fire.
- The normal dispersion pattern is narrow in deflection and long in range. It permits effective coverage of such targets as roads and runways. Very close supporting fire can be delivered when the gun-target line is parallel to the FLOT.
- Precision fire control equipment permits accurate direct and indirect fires while the ship is under way or at anchor.

Limitations. Limitations of NGF include—

- The relatively flat trajectory results in a large range of probable error. The gun-target line in relation to the FLOT must always be considered. The FSO should avoid a gun-target line that passes toward or directly over friendly troops.
- Naval guns are less accurate in rough seas.
- The shore bombardment allowance varies with the ship type. When the need arises, remaining rounds will be held for self-defense.

- If a ship comes under attack, it may cancel its fire mission with the ground forces to counter the threat.
- The sole means of communication from ship to shore is HF AM radio, which is not compatible with standard Army FM radios.

Table 7-4. Fire support ships and their characteristics.

SHIP	GUN SIZE/CALIBER	RANGE (METERS) MAXIMUM/MINIMUM	RATE OF FIRE (ROUNDS PER MINUTE) MAXIMUM/SUSTAINED	AMMUNITION AVAILABLE
Battleship	16-inch/50 5-inch/38	35,909/910 15,700/910	2/1 22/15	HE, AP, ICM HE, WP, illum
Guided missile cruiser (CGN and CG)	5-inch/38 5-inch/54	15,700/910 22,999/910	22/15 40/20	HE, WP, illum HE, WP, illum
Guided missile destroyer (DDG)	5-inch/54	22,999/910	40/20	HE, WP, illum
Destroyer (DD)	5-inch/54	22,999/910	40/20	HE, WP, illum
Guided missile frigate (FFG)	5-inch/38	15,700/910	22/15	HE, WP, illum
Frigate (FF)	5-inch/38 5-inch/54	15,700/910 22,999/910	22/15 40/20	HE, WP, illum HE, WP, illum
Amphibious assault ship (LHA)	5-inch/54	22,999/910	40/20	HE, WP, illum

LEGEND:

AP	= armor piercing	DDG	= guided missile destroyer
CG	= guided missile cruiser	FF	= frigate
CGN	= guided missile cruiser, nuclear	FFG	= guided missile frigate
DD	= destroyer	LHA	= amphibious assault ship, general purpose

NOTE: First-round danger close is 750 meters for all 5-inch munitions; 1,000 meters for 16-inch HE; and 2,000 meters for AP and ICM munitions.

Employment. Light armor units normally receive NGF support indirectly through the light infantry headquarters to which they are task organized. On occasion a light armor company, when operating pure or task organized as a team, will receive an FCT to request and adjust NGF. The light armor battalion will receive a SALT when it is organized as a TF. In some instances, when ANGLICO assets are limited, the battalion may only receive an FCT.

NGF ships are assigned the missions of DS or general support (GS) in much the same way as artillery is organized for combat:

- DS. A ship in DS usually supports a battalion. This ship can deliver both planned and on-call fires. On-call fires are normally requested and adjusted by the FCT of the supported unit or by an air spotter.
- GS. A ship is usually placed in GS of a brigade or division. The fires for the GS ship are conducted as directed by the NGO of the supported unit.

Section II. Tactical Air Support

US AIR FORCE TACTICAL AIR SUPPORT

TACAIR provided by the USAF consists of CAS, counterair (CA), air interdiction (AI), tactical airlift (TA), and tactical air reconnaissance. TA, AI, and CA are normally allocated at higher than brigade level. The following considerations apply:

- TACAIR reconnaissance is the acquisition of intelligence information using visual observation and/or sensors in aircraft.
- CAS is defined as air attack on hostile surface forces that are in close proximity to friendly troops. CAS can be employed to blunt an enemy attack, support the momentum of the ground attack, or provide cover for friendly movements. For best results while avoiding mutual interference or fratricide, aircraft are kept under “positive control” (part of the USAF’s TACAIR control system). The effectiveness of CAS is directly related to the degree of local air superiority attained. Until air superiority is achieved, competing demands for CAS and CA operations for available aircraft may limit sorties apportioned for the CAS role. CAS is the primary support given to committed brigades and battalions. Nomination of CAS targets is the responsibility of the commander, ALO, and S3 at each level.

The use of aircraft to support ground forces is subject to the following planning considerations:

- Air support is not available at all times. Even when planned, it may be diverted to a higher priority mission (immediate).
- Immediate requests may restrict indirect fires and will come with whatever ordnance has already been loaded-not necessarily the optimum weapon for a particular target.
- Air support may be limited by weather and enemy air defense systems.
- Support aircraft have varying capabilities to remain on station (loiter time).
- Target identification is difficult, so marking of enemy and friendly locations is required when in close contact.
- As long as the enemy has an effective air force, the emphasis will be on CA. As the battle progresses and the enemy’s air capability is reduced, the emphasis will shift to CAS.

PLANNING CLOSE AIR SUPPORT

The battalion commander, aided by the S3, is responsible for planning fire and movement, just as he is in other FS planning. The following personnel are also involved in planning the use of TACAIR, particularly CAS.

Battalion S3-Air. The S3-Air receives, ranks, approves, and coordinates requests for planned CAS. He integrates CAS into the ground commander’s scheme of maneuver. He keeps the Air Force TACP advised on the current ground tactical situation, of the location of friendly units, and of any FS coordination and control measures established.

Battalion FSO. The battalion FSO is the full-time FSCoord for the battalion. He advises the battalion commander on all FS matters, including the use of CAS. He is also a focal point for CAS planning and coordination between the battalion commander, the S3-Air, and other interested parties. The FSO integrates CAS into the FS plan.

Tactical Air Control Parties. The USAF provides one TACP to each maneuver battalion. Each TACP includes an ALO, who performs FAC duties, and two TACAIR C2 specialists. One of the specialists is trained in terminal air control techniques and can perform TACP duties. The ALO supervises the activities of the TACP personnel; he advises the commander, FSO, and S3-Air on capabilities and limitations of TACAIR and other technical or tactical aspects of TACAIR missions as required. The ALO uses USAF TACAIR requests to maintain radio contact with all other TACPs in the division and with the air support operations center (ASOC). When possible, he provides final coordination of CAS missions in the battalion area. The TACP transmits to the ASOC all requests for immediate CAS. He advises the S3-Air and FSO of other units' immediate air requests. As changes in the TACAIR situation are transmitted over the TACAIR request net, the ALO relays them to the S3-Air and FSO.

TACP procedures in this manual conform to US Army and USAF standards. TACPs participating in allied operations should be familiar with the characteristics and attack profiles of all aircraft that may support ground operations.

Preplanned Missions. Preplanned missions are those for which a requirement can be foreseen. They permit detailed planning, integration, and coordination with the ground tactical plan. In the defense, CAS can be used to thicken fires in a decisive EA. In the offense, CAS can be planned to strike an anticipated enemy counterattack in the vicinity of an objective. Inherent in such preplanned CAS missions is the possibility that the target will not appear at the place and time that was expected. Such missions would then be released and used to fill requests for immediate CAS elsewhere on the battlefield. Preplanned CAS missions are most desirable because munitions can be tailored to the target and complete mission planning can be accomplished. Categories of planned CAS are—

- **Scheduled mission.** This is a CAS strike on a planned time on target (TOT), and will be included in the daily air tasking order (ATO).
- **Alert mission.** This is a CAS strike on a preplanned target area executed when requested by a supported unit. It is usually launched from a ground alert but may be flown from an airborne alert status. Alert (on-call) CAS allows the ground commander to designate a general target area within which targets may need to be attacked. The ground commander designates a conditional period within which he will later determine specific times for attacking the targets.

Requests for planned CAS missions originating at the light armor battalion level are forwarded to the brigade FSE over the 01 net or by any other means available. When the request is received by the FSE, it is reviewed by the G3-Air, the FSO, and the ALO. They determine the suitability of the targets for air attack and consider potential airspace conflicts. The FSO may decide that it would be better to use another weapon system against that target. As a minimum, he will integrate CAS into his FS plan. The G3-Air will then add the request to the tile for planned CAS missions, eliminate duplications, and assign target priorities. He then forwards the consolidated request to an assistant G3. Consolidated requests are coordinated with the division FSCoord and ALO. The requests are then forwarded to the corps G3-Air. [Figure 7-6](#) depicts the planned CAS request net.

Immediate Missions. Immediate missions are executed in response to requests from supported ground maneuver commanders to fulfill urgent requirements that could not be foreseen. Details of such missions are normally coordinated while the aircraft are in the air.

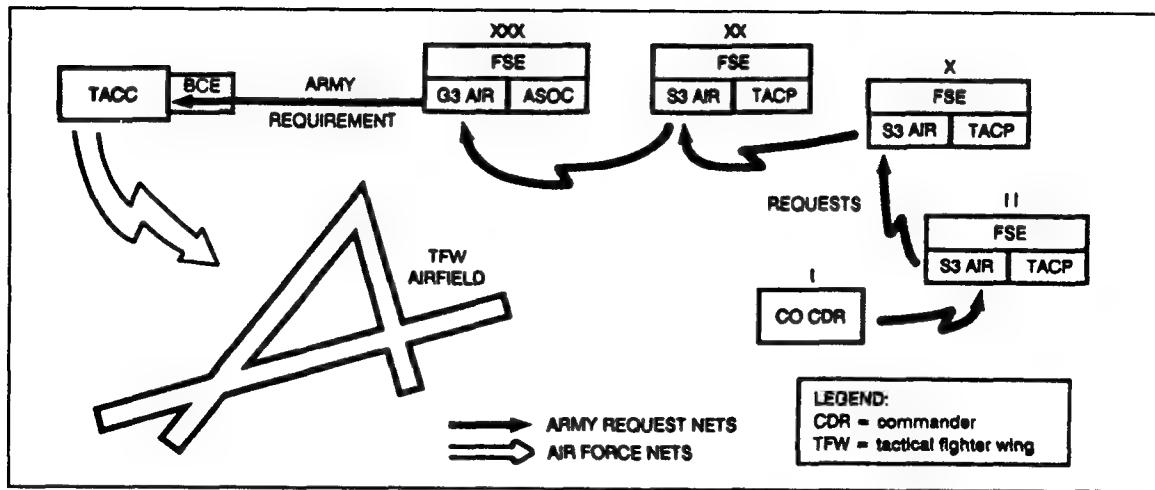


Figure 7-6. Planned close air support request channels.

Immediate mission requests are normally processed through USAF channels. Before requesting immediate CAS, the following points should be considered:

- Target type. CAS is most effective when attacking exposed and/or moving enemy forces and air defense assets.
- Enemy air defenses. Both antiaircraft artillery (AAA) and surface-to-air missiles (SAM) are systems that may require suppression before CAS can be effective.
- Target acquisition. Well-camouflaged or small, stationary targets are difficult for pilots to acquire. These kinds of targets will require some kind of marking for identification. The use of an FSE or COLT to laser-designate a target can help target acquisition.
- Day or night observation. For night missions, the FSO should give special attention to target identification and the use of artillery to illuminate the target.
- Time available. Response and station time for CAS aircraft can vary from a few minutes to more than an hour. The TACP will normally have the most up-to-date information.

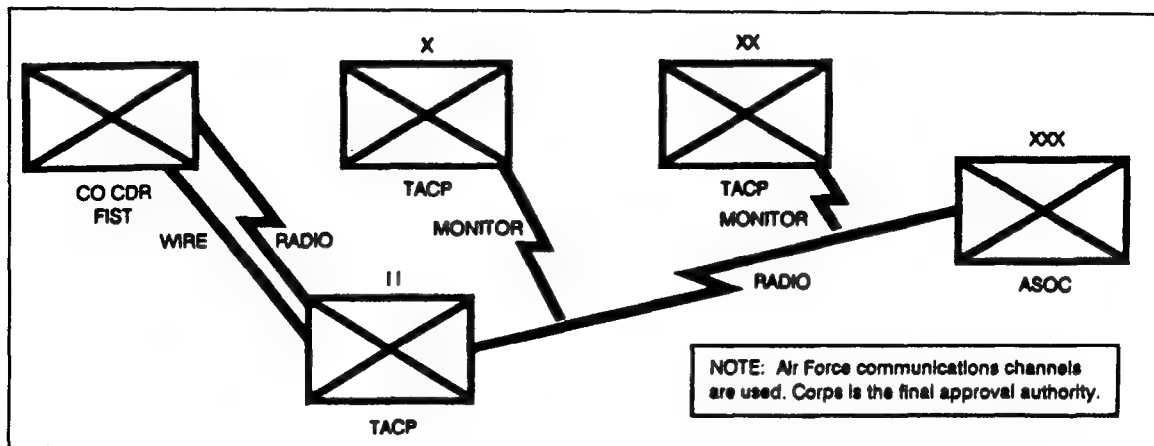


Figure 7-7. Immediate close air support request channels.

Requests for immediate CAS missions that originate at maneuver company level are forwarded to the battalion FSE and to the ALO (see [Figure 7-7](#)). Based on direction from the S3 and FSO, the ALO can make the request through the TACAIR request net from the TACP directly to the ASOC. The TACP at each level monitors the request and acknowledges receipt. Silence by an intermediate TACP indicates approval of the request by the associated Army echelon. If any echelon above the requesting echelon disapproves the request, the TACP at that echelon notifies the ASOC and the initiating TACP, giving the reason for disapproval. When the request is approved, the ASOC orders the mission flown. Immediate missions involve launching general alert aircraft using air alert sorties and/or diverting aircraft from other missions. [Figure 7-8](#) depicts a typical immediate CAS request flow.

Before CAS aircraft release ordnance on the target, the TACP and FSO must accomplish several tasks. Radio frequencies and laser designation settings used by the FSOs, COLTs, and tactical aircraft should be predetermined and forwarded to all parties. Since most aircraft do not have FM radios, the ALO will use the ultrahigh frequency (UHF) tactical air direction net to communicate with CAS aircraft. Most USAF FM capability is nonsecure; therefore, it is critical that proper authentication procedures be used when FM radios are employed.

Following approval of the CAS request, the TACP and tactical air controller (TAC-A) receive aircraft mission data from the ASOC. These data include mission number, aircraft call sign, number and type of aircraft, ordnance carried, and TOT. The TACP determines any additional essential information, such as updated enemy locations and identification means, availability of fires for suppression of enemy air defense (SEAD), friendly ADA considerations, and time factors for the attack. If CAS aircraft are fitted with LSTs, the laser setting must be passed to the attack aircraft. When aircraft arrive at the target area, the TACP provides the pilots with updated information. They must be given enough information to positively identify the target. The TACP is also prepared to abort the attack if the safety of friendly troops is threatened. During the entire attack, the ALO watches for enemy surface-to-air fires and warns the aircraft accordingly.

If the CAS aircraft are fitted with LSTs, the TACP coordinates with the FSO or COLT to ensure that the targets are accurately marked for the aircraft. The LST-equipped aircraft detects the reflected laser, locks onto it, and illuminates an aiming cue in the pilot's head-up display. Even with laser designators, the use of marking smoke should be considered to help the pilot aim his LST accurately. Caution should be used to avoid laser-to-target visibility and attenuation problems caused by the smoke.

CAS Planning Considerations. CAS mission success is directly related to thorough mission planning based on the factors discussed in the following paragraphs.

Weather. Does the weather favor the use of aircraft? What is the forecast for the immediate future? Weather is one of the most important considerations when visually employing weapons; it can hinder target identification and degrade weapon accuracy.

Target Acquisition. Targets that are well camouflaged, small and stationary, or masked by hills or other natural terrain are difficult to identify from fast-moving aircraft. The use of marking rounds can enhance target identification and help ensure first-pass success. Moving targets will usually highlight themselves.

Target Identification. This is critical if CAS aircraft are to avoid attacking friendly forces by mistake. It can be accomplished by providing a precise description of the target in relation to terrain features easily visible from the air. Smoke, laser target marking, or other means can also be used.

Identification of Friendly Forces. Safe means of friendly position identification include mirror flashes, marker panels, and direction and distance from prominent land features or target marks.

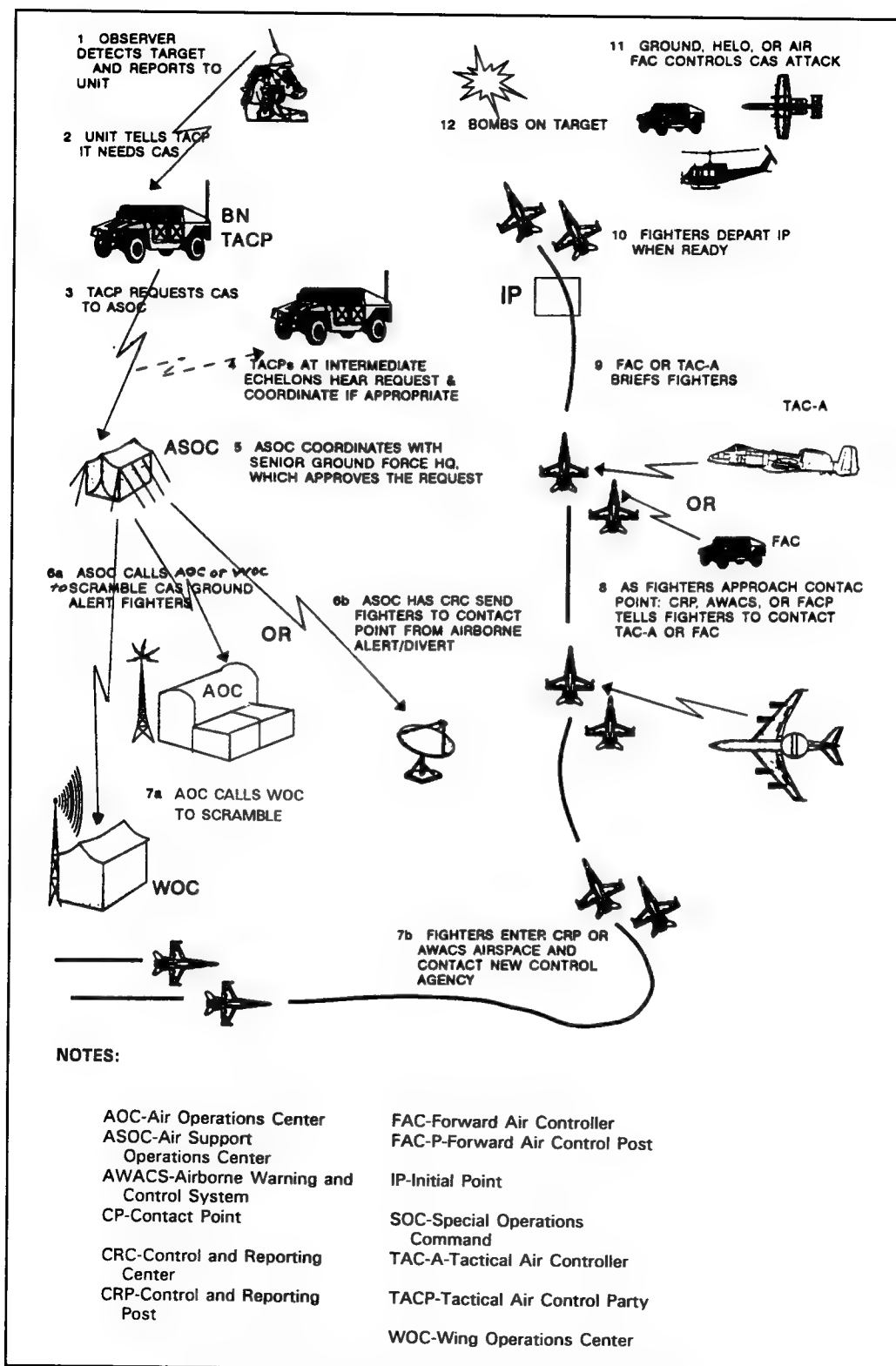


Figure 7-8. Typical immediate CAS request flow.

General Ordnance Characteristics. What types of targets are to be engaged, and what are the desired weapon effects?

Final Attack Heading. Choice of the final attack heading depends upon considerations of troop safety, aircraft survivability, and optimum weapon effects. Missiles and bombs are effective from any angle. Cannons, however, are more effective against the sides and rears of armored vehicles.

Troop Safety. This is a key consideration in using CAS. The primary cause of fratricide is misidentification of friendly troops as enemy forces.

SEAD. SEAD will be required based on the capabilities of the aircraft and presence of enemy air defense systems in the target area.

CAS and Artillery Integration. Army artillery and tactical airpower are complementary. Because artillery support is more continuous and responds faster than CAS, CAS missions must be integrated with artillery so that limited firing restrictions are imposed. The ACA is the FS coordination measure used to accomplish this integration. There are four standard ACAs: lateral, altitude, timed, and altitude and lateral separation.

Other planning factors that must be considered are time available for planning, C3 and terrain. Refer to FM 6-20-50 for these additional planning factors.

Strike Execution. As the CAS aircraft reach the general vicinity of the target, they fly to a contact point that is normally given to the pilots through USAF channels. At the contact point, the pilots change radio frequencies and come up on the supported ground unit's TACP frequency. The pilots are then given a situation update by either a TAC-A or the ALO as they continue flying in the direction of the target. The CAS aircraft then fly to a reference point on the ground that the pilots can identify from the air, called the initial point (IP). When the CAS flight leader is cleared to attack, he switches to the attack frequency, contacts the TACP, and reports when his flight departs the IP and is en route to the target. This radio call is used to coordinate any required SEAD and/or target marking rounds.

It is important to remember that this entire procedure, in a high-intensity, high-threat environment, would have to be done as smoothly and quickly as possible. If the attack aircraft are not aligned with the correct target or if friendly troops may be endangered, the TACP must abort the attack. The CAS abort procedure uses a challenge and reply response. The CAS flight leader gives the TACP the two-letter challenge code; the reply "letter" from the TACP is the abort-call "code word." The reply letter should be transmitted after the words "ABORT, ABORT, ABORT." This procedure is possible only if the TACP or ALO has the same authentication system as the aircraft.

An effective daytime technique of marking target areas is to fire a mortar smoke round into the target area. Pilots can easily verify the target area prior to releasing ordnance. During limited visibility, the same technique can be used only using illumination rounds set for ground burst.

Night Planning and Operation Considerations. In a high-intensity, high-threat environment, the capabilities of CAS aircraft employed at night are very limited. To improve the capabilities of night CAS, the USAF is acquiring additional night-capable systems such as the low-altitude navigation and targeting infrared for night (LANTIRN) system. Despite the limitations, CAS aircraft still have a few advantages while attacking at night. The most important advantage is the limitation darkness imposes on enemy optically-sighted and infrared (IR) anti-aircraft systems. This is particularly true if they do not have NVD. Airborne or ground-based illumination can also degrade enemy night-vision capabilities.

The two most important requirements of a night CAS operation are identification of the enemy or target and positive marking of friendly unit locations. The ground maneuver commander should rely on his own Army assets to accomplish the marking and illumination

requirement. Although flares released from airborne FACs, other CAS aircraft, or "flare ships" can effectively illuminate target areas, illumination fired by ground artillery and heavy mortars are normally preferred due to the continuous capabilities of sustained indirect fire. Fixed-wing aircraft that can conduct night CAS missions with battlefield illumination are the AV-8B, A-10, A-7, F-16, F-4, F-111, and F/A-18.

Laser designation capabilities of the A-10, A-7, AV-8B, and F/A-18 enable these aircraft to acquire targets without use of conventional illumination. The LSTs carried by these aircraft detect the reflected laser, lock onto it, and provide the data directly to the pilot. The F-4, F-16, F/A-18 and A-7 can also use radar to provide reference information for night operations. In addition, small radar reflectors, optimized for particular airborne radars, can create spotting cues for CAS aircraft.

Marking friendly unit locations improves joint air attack team (JAAT) and CAS safety and also provides target area references. Tracers and radar beacons can serve both purposes. If safe separation is a factor, friendly unit marking is critical. Fired into the air, 40-mm illumination grenades and flares are effective, but they may be useful to the enemy as well. Flares used during limited visibility operations can create the "milk-bowl" effect, making it more difficult for a CAS aircraft to find its target. When used under a low cloud ceiling, flares can also highlight the aircraft against the cloud cover. Strobe lights are very good night markers. They are commonly used with blue or IR filters and can be made directional by the use of any opaque tube. In overcast conditions, strobe lights can be especially useful. Aside from the obvious security considerations, almost any light that can be filtered or covered and uncovered can be used for signaling aircraft.

USAF Aircraft Characteristics. CAS missions never consist of less than two aircraft sorties. These aircraft may make more than one pass over the target area except in high-intensity, high-threat situations, where the capabilities of modern air defense systems present added dangers. The following paragraphs provide examples of two types of aircraft, the A-10 and the A-7, that will normally be given CAS missions. Table 7-5 is a summary of reference data for aircraft that perform CAS missions; Table 7-6 is a summary of ordnance available for CAS.

Table 7-5. Aircraft reference data.

AIRCRAFT	MINIMUM CEILING	RADIOS	ACQUISITION MEANS	LOITER TIME*	NIGHT OPS CAPABILITY
A-7 USAF (RC) USN	2,000	UHF FM	Visual LST	30-40 min	Radar Flare LST
A-10 USAF	1,500	UHF VHF FM	Visual LST	1-2 hrs	Radar Flare LST
F-4 USAF (RC)	3,000	UHF	Visual Radar	20-30 min	Radar Flare FLIR
F-16 USAF	1,500	UHF VHF FM	Visual Radar	20-30 min	Radar Flare FLIR, LANTIRN
OV-10A, D USMC	1,500	UHF VHF FM	Visual LST	1-2 hrs	Radar FLIR LST
F-15E USAF	1,500	UHF VHF FM	Visual LST	20-30 min	Radar Flare FLIR, LST LANTIRN
F-111 USAF	700	UHF VHF	Visual Radar	20-30 min	Radar Flare FLIR

Table 7-5. Aircraft reference data (Cont).

AIRCRAFT	MINIMUM CEILING	RADIOS	ACQUISITION MEANS	LOITER TIME*	NIGHT OPS CAPABILITY
F/A-18, D USN/USMC	Mission Specific	UHF VHF-FM VHF-AM	Visual Radar LST	30-45 min	Radar FLIR LST/NVG
AV-8B USMC	Mission Specific	UHF VHF-FM VHF-AM	Visual LST	30 min	LST FLIR/NVG
A-6E USN/USMC	Mission Specific	UHF	Visual Radar LST	45-60 min	Radar FLIR LST
AC-130 USAF	1,500	UHF VHF-FM VHF-AM	Visual Radar LST	2-3 hrs	Radar FLIR LST

*Loiter time is approximate based on flight time to and from the objective, ordnance, fuel pods, threat, and fuel tanker support. LST-laser spot tracker; FLIR-forward looking infrared; LANTIRN-low altitude navigation and targeting infrared for night; RC-reserve component (no longer in active inventory).

Table 7-6. Aircraft ordnance reference data.

WEAPON	DESCRIPTION	MINIMUM SAFE DISTANCE	
		(10% Pi)	(0.1% Pi)
MK 82 LD	500-lb bomb	250 m	425 m
MK 82 HD	500-lb bomb	100 m	375 m
MK 82 LGB	500-lb bomb (GBU-12)	*	*
MK 83 HD	1,000-lb bomb	275 m	500 m
MK 83 LD	1,000-lb bomb	275 m	500 m
MK 83 LGB	1,000-lb bomb (GBU-16)	275 m	500 m
MK 84 LD	2,000-lb bomb	225 m	500 m
MK 84 LGB	2,000-lb bomb (GBU 10-22)	*	*
MK 20**	ROCKEYE CBU	*	*
CBU-87	Combined effects munition	*	*
CBU-89	Gator munition system	*	*
CBU-97	Sensor fuzed weapon	*	*
SUU-11	7.62-mm mini-gun	*	*
M-4/M12/ SUU-23/M-61	20-mm Gatling gun	*	*
GAU-12	25-mm Gatling gun	*	*
GPU-5A/GAU-8A	30-mm Gatling gun	*	*
AGM-65	Maverick missile (TV/IR/laser)	*	*
MK 21/29	WALLEYE I 1,000-lb bomb (TV guided)	275 m	500 m
MK 23/30	WALLEYE I 2,400-lb bomb (TV guided)	*	*
AGM-123A	SKIPPER II 1,000-lb bomb (laser guided; rocket boosted)	275 m	500 m

* Minimum safe distances have not been determined.
 **Not recommended for use near friendly troops.
 Pi-probability of incapacitation; LD-low drag; HD-high drag; LGB-laser guided bomb;FFAR-folding fin aircraft rocket; GBU-guided bomb unit; AGM-air-to-ground missile.

The A-10 (Thunderbolt) is designed specifically for the CAS role. In a typical CAS mission, the A-10 could fly 150 miles and remain on station for an hour. It can carry up to 16,000 pounds of mixed ordnance with partial fuel, or 12,086 pounds with full internal fuel. The 30-mm GAU-8A gun carried by the A-10 can fire 2,100 or 4,200 rounds per minute and defeat the whole range of ground targets encountered in the CAS role, including tanks. In addition to the GAU-8A, the A-10 can also carry free-fall or guided bombs, gun pods, six AGM-65 Maverick missiles, jammer pods, and the Pave Penny laser spot tracker. A typical standard ordnance load for the A-10 is two to four Maverick missiles and over 1,100 rounds of 30-mm ammunition, consisting of an armor-piercing incendiary (API) and high-explosive incendiary (HEI) mix. The API has a depleted uranium penetrator. The Maverick used by USAF aircraft uses TV or IR seekers with fire-and-forget and day-night capabilities. The warhead is a 165-pound shaped charge for use against tanks or a 300-pound penetrating high explosive. Time required to acquire and lock the weapon onto a target usually restricts the A-10 to one missile per pass. In a target-rich environment, there may be time for further engagements with the 30-mm gun before breaking off the attack. The 30-mm gun is normally aimed at a point target and fired for a one-second burst of 30 rounds. The on-board load of 1,170 30-mm rounds, fired at 2,100 rounds per minute, could be expended in just 30 seconds.

The A-7 (Corsair) is a subsonic tactical fighter that was delivered to the USAF and Navy between 1968 and 1976. The A-7 has on-station time of 30 to 50 minutes with a maximum speed of 663 mph. The aircraft's outstanding target kill capability, first demonstrated in Southeast Asia, is achieved with the aid of continuous-solution navigation and weapon-delivery systems, including all-weather radar bomb delivery. Additionally, a large number of A-7s were modified to carry the same Pave Penny laser target designation pod as the A-10. The A-7 can carry up to 15,000 pounds of air-to-air or air-to-ground missiles, bombs, rockets, and gun pods. In addition, it has the standard M-61A1 20-mm Vulcan gun, which is effective against lightly armored vehicles.

The F-16 (Fighting Falcon) is a single-engine, single-seat, lightweight, high-performance, multirole aircraft. This highly maneuverable fighter excels in air-to-air and air-to-surface roles. In the air-to-surface role, using a 20-mm Gatling gun, it is the most accurate aircraft in the inventory and can be used for both CAS and AI.

US NAVY/MARINE CORPS TACTICAL AIR SUPPORT

US Navy (USN) and/or US Marine Corps (USMC) air requests are forwarded by the respective SALTS to the aviation unit in support of the unit. The brigade FSO submits all air requests, including those for USMC attack helicopters (AH-1W Cobra), through the Marine air officer or ANGLICO. The actual terminal control of the air assets is done by the firepower controller of the FCT. In the absence of an observer, USN and/or USMC air may be controlled by the company FSO, the ALO, or the USAF FAC.

Like USAF support, USN/USMC TACAIR never consists of less than two aircraft sorties. These aircraft may make more than one pass over the target area, but loiter time is contingent on transit distance. Refer to [Figure 7-4](#) and [Table 7-1](#) for additional information. The following are the two most common USN/USMC aircraft that provide CAS to light armor operations.

- The F/A-18/D (Hornet) is an extremely versatile aircraft that can provide excellent CAS with its 20-mm rotary cannon and a basic load of either 515 or 580 rounds. Loiter time is 30 to 45 minutes, depending on external fuel tanks and ordnance load. The F/A-18 can carry 13,700 pounds of conventional ordnance consisting of 2.75-mm and 5-mm rockets, Walleye, HELLFIRE, TOW missiles, fuel-air explosive (FAE) and flares. It is equipped with a laser designator, radar, and FLIR/NVG. The maximum speed is 1,190 mph (without ordnance or external fuel tanks).

- The AV-8B (Harrier) can also provide CAS with its 25-mm rotary cannon, however, its basic load is only 300 rounds and can only remain on station for up to 30 minutes. The AV-8B can carry 8,000 pounds of the same type of external ordnance as the F/A-18. For target acquisition, it has LST and FLIR/NVG. The maximum speed is 685 mph (without ordnance or external fuel tanks).

Section III. Army Aviation Support

Army aviation assets will deploy with light infantry contingency TFs. Light armor units may operate with attack and/or reconnaissance aviation assets to perform reconnaissance and security operations.

ORGANIZATION

The organization of the light division aviation brigade and reconnaissance squadron is dependent upon whether the division is light, airborne, or air assault. The ACT in each type of division, however, has the same organization.

CHARACTERISTICS

The capabilities of the AH-1, AH-64, and OH-58D attack helicopters include—

- The AH-1 Cobra can carry multiple loads, dependent on the mission, enemy situation, and atmospheric conditions. Weapon systems include 2.75-inch rockets, 7.62-mm minigun, 40-mm grenade launcher, 20-mm cannon, and TOW.
- The AH-64 Apache is equipped with the pilot night vision sensor to enhance flight during periods of reduced visibility. It also has a target acquisition sight/designator to lase targets for laser energy-seeking munitions. Its weapon systems include 2.75-inch rockets, 30-mm cannon, and the HELLFIRE missile.
- The OH-58D (Kiowa Warrior) is the armed version of the OH-58 (AHIP) with HELLFIRE, Stinger, 2.75 rockets, and .50 caliber machine guns. The helicopter is equipped with a thermal imaging system (TIS) and a low-light camera system. The helicopter is capable of operating on a digital TACFIRE network. The Kiowa Warrior will eventually replace all Cobras and Kiowas in the cavalry squadrons and attack battalions of the light and airborne divisions.

EMPLOYMENT

The aviation brigade provides divisional Army aviation support. This support can be for attack, air movement, air assault, reconnaissance, intelligence, security, and/or logistical operations. Cargo helicopters (CH-47s) are available only in the aviation brigade of the air assault division or at corps level.

Light armor leaders at all levels must be aware of the integration of Army aviation assets into the maneuver plan so that light armor and rotary aircraft can work efficiently as a team.

Light armor units will normally work with Army aviation assets in reconnaissance, security, or logistical roles.

An ACT may operate with a light armor battalion during a reconnaissance or screen mission. Planning and guidance for future operations are conducted by the light armor battalion. The light armor unit commander assigns missions to the ACT commander. The light armor battalion staff provides essential intelligence, logistical, and FS information. The ACT

commander can respond quickly to support a ground commander's scheme of maneuver. The minimum information he must know is—

- Enemy situation.
- Availability of FS.
- FS coordination measures in effect.
- Current battlefield graphics.
- Attack helicopter assets in the area.
- Disposition of friendly ground elements.
- Commander's relationship to the new unit.
- Person to whom spot reports are to be reported.
- Location of supporting Classes III and V aviation assets.

An ACT may also work with light armor companies or platoons as a reconnaissance team. For example, during the early stages of a CONOPS, air reconnaissance aircraft can provide early warning for the mobile light armor ground force tasked to provide security for the airhead. Available light armor and ACT assets can be task organized by the commander to provide a highly mobile screening force in a predominantly dismounted brigade AO.

Attack Helicopter Mission. The primary mission of attack helicopters is to destroy massed enemy forces with aerial firepower, mobility, and shock effect. Light armor with attack helicopter augmentation significantly gain, maintain, and exploit the initiative to defeat the enemy. They operate in offensive, defensive, or special purpose operations. The attack helicopter can be committed early in battle. It can reinforce ground combat units and can attack, delay, or defend by engaging the enemy with direct and indirect fires. Attack helicopter battalions cannot seize or retain terrain without cross-attached ground maneuver forces. However, to deny terrain to the enemy for a time, they can dominate the terrain by fire. Also, attack helicopters are limited by a combination of fuel capacity and flight time, weather and visibility restrictions, and the air defense environment. They are most effective when employed as a battalion. Attack helicopters can also be assigned to do the following:

- Conduct rear operations.
- Coordinate and adjust indirect fires.
- Suppress or destroy enemy air defense assets.
- Reinforce ground maneuver forces by fire.
- Conduct JAAT operations with CAS and FA assets.
- Destroy enemy communication and logistical assets.
- Disrupt and destroy enemy second echelon and follow-on forces.
- Protect air assault forces during all phases of air assault operations.
- Destroy enemy helicopters that pose an immediate threat to mission accomplishment.

Considerations. The commander must consider the following factors before employing attack helicopters and air cavalry/reconnaissance troops.

Offense. Attack helicopters conduct combat operations against enemy force alone or along with friendly ground forces. In the offense, attack helicopters are most effective against a

moving or counterattacking enemy force. They are least effective against a dug-in enemy force. With proper planning, attack helicopter battalions can provide antiarmor firepower against an enemy armored force. Rather than being used as a reaction force, attack helicopter battalions should be integrated into the maneuver battalion's scheme of maneuver. This is normally done at division or brigade level and must include coordination for terrain to support attack helicopter operations.

Defense. Attack helicopters, due to their mobility are shifted on the battlefield as needed. They are used to stop enemy penetration into the main battle area, to attack enemy in the covering force area, or to reinforce or thicken the defense on parts of the battlefield. They can also perform effectively in an economy-of-force defensive role. Planners must coordinate BPs for attack helicopters.

The light armor battalion may, on rare occasions have attack helicopter assets OPCON to assist in an antiarmor battle. An army aviation LO may be provided to the battalion to coordinate aviation support when this type of mission is planned. He will advise the commander and assist in planning the use of aviation assets to support the maneuver plan.

Section IV. Air Defense Support

Air defense planning is critical to light armor units. Light divisions, unlike armored or mechanized divisions, do not create a signature that is easily identifiable by aircraft. When moving, however, light armor produces a battlefield signature that can be easily observed by enemy attack aircraft. Commanders should consider task organizing air defense assets to light armor units to counter this threat. Light armor leaders must stress to their attaching headquarters the importance of air defense support.

ORGANIZATION

The normal air defense support provided to the light armor battalion is a Stinger section. On occasion, the battalion may also receive an Avenger platoon. The unit's mission and the division commander's air defense priorities will determine the type and amount of air defense weapons allocated to the battalion.

The Stinger section consists of a section headquarters with a section chief, his driver, and five man-portable air defense systems (MANPADS) teams. Each team consists of two team members and six missiles mounted on a HMMWV.

The Avenger platoon consists of six Avenger fire units. Each Avenger team consists of two team members and a HMMWV.

Senior Air Defense Officer. The senior air defense representative for the light armor battalion will be the Stinger section sergeant or, in some cases, the Avenger platoon leader. Either will serve as a special staff officer during the battalion planning process. Based on the commander's intent and priorities, scheme of maneuver, air IPB, and higher headquarters OPORD, the senior air defender will develop the air defense plan. Once it is approved, he will task organize his assets to provide protection to these priorities. After receiving approval for his task organization, he will ensure it is incorporated into the OPORD. The senior air defender will coordinate with the staff sections of the battalion. The battalion staff should provide the air defense officer with the following information:

- The S2 provides information on the ground and air threat and the unit's PIR. The air IPB is maintained and can be developed by the S2 and the senior air defender.
- The S3 provides the unit OPORD and tactical SOP. This includes overlays; preplanned locations; commander's intent; and concept of the primary operation and follow-on operations; commander's priorities; what units expect heaviest ground and air action;

what assets are most critical, most vulnerable, and easiest to recover or replace; special or modified brevity or operations codes, key words, or emergency procedures; points the battalion commander wants covered in daily briefs; SOI; resupply; the unit's MOPP status; and how changes are disseminated.

- The S4 provides the following resupply information: Class I pickup points, times, and feeding cycles; Class II resupply of NBC suits, gear, and batteries; Class III refueling locations and times; Class V arrangement for supply of specialized ammunition; Class LX procedures for ordering and receiving parts and locations and times for pickup. He also determines how resupply is handled and, if the air defense unit has been considered in the planning, who will maintain air defense units' nonsystem-peculiar equipment and where these maintenance assets are located.

Air Defense Annex. Once the battalion commander gives his maneuver plan and intent for air defense, the senior air defender can prepare the annex to the OPORD. He may either write his plan as a five-paragraph annex to the OPORD or as an execution matrix. The senior air defender must conduct detailed coordination with other staff sections to develop these instructions.

CHARACTERISTICS

Stinger. The Stinger is a man-portable, shoulder-fired, IR-homing (heat-seeking) air defense guided missile. It has a range of more than 5 Kilometers. It is designed to counter high-speed, low-level ground attack aircraft, helicopters, observation aircraft, and transport aircraft. It is maneuverable and can be integrated within the unit's scheme of maneuver. Since its prime mover is a thin-skinned HMMWV, the Stinger should overwatch the force from high ground.

Avenger. The Avenger air defense weapon system is the line-of-sight rear (LOS-R) family of forward area air defense (FAAD) weapon systems designed to counter high speed, low-level, fixed-wing helicopters; observation aircraft and transport aircraft. The Avenger carries eight ready-to-fire Stinger missiles mounted on a HMMWV. The Avenger team can conduct stationary and mobile operations. The major components of the Avenger are a rotatable turret with two standard vehicle missile launchers (SVML); a gun system (.50 caliber machine gun); a forward looking infrared (FLIR); a laser range finder (LRF); identification, friend or foe (IFF); and a remote control unit (RCU). The Avenger will normally be used to defend assets in the division and brigade rear area. The Avenger is a light-skinned weapon system, but it can be used to support maneuver operations dependent on the factors of METT-T.

EMPLOYMENT

The TF commander must consider the factors of METT-T and provide his intent for the operation. The senior air defender allocates air defense assets based on the TF commander's ADA priority considerations and employment guidelines. He then provides input on the COAs and air defense priorities during the planning process.

Rules of Engagement (ROE). Air defense ROE are directives that specify the circumstances under which an aircraft can be engaged. The Stinger team chief and Avenger squad leaders are responsible for deciding whether an aircraft is hostile or friendly. ROE include hostile criteria and weapon control statuses:

- Hostile criteria include aircraft that attack friendly elements, violate airspace control measures, respond improperly to IFF interrogation, and are visually identified as an enemy.

- The following weapon control statuses describe relative degrees of restriction with which fires of ADA systems are managed:
 - Weapons free. Fire at any aircraft not positively identified as friendly.
 - Weapons tight. Fire only at aircraft identified as hostile according to prevailing hostile criteria.
 - Weapons hold. Do not fire except in self-defense or in response to a formal order.

Air Defense Warnings. These warnings indicate the probability of hostile aircraft and/or missile attack:

- Red. Attack by aircraft or missile is imminent or in progress.
- Yellow. Attack by hostile aircraft or missiles is probable.
- White. Attack by hostile aircraft or missiles is improbable.

Local air defense warnings (LADW) are used at division level and below. Each LADW has a corresponding action taken by maneuver units according to the division TSOP. Some examples are—

- DYNAMITE: Aircraft are inbound or attacking now. Response is immediate.
- LOOKOUT: Aircraft are in the area of interest, but are not threatening or inbound yet.
- SNOWMAN: No aircraft pose a threat at this time.

Responsibilities. The Avenger platoon leader commands and maneuvers his platoon from his HMMWV; he does not collocate. The platoon leader monitors the battery command net, the early warning net, the supported unit, and the platoon command net. Each Avenger team monitors the early warning and platoon command nets. The Avenger platoon sergeant is responsible for platoon logistics. He collocates with battalion trains and moves forward with the platoon ammunition vehicle to provide logistical support for the platoon.

The Stinger section chief commands his section from his HMMWV. Once he has task organized his section, he can monitor the early warning net within the TOC. The section chief monitors the early warning net, the section command net, and either the battery command or the supported unit net. The Stinger team monitors the early warning and section command nets. The Stinger section chief is responsible for section logistics. He must ensure that he coordinates with the Stinger platoon sergeant for missile resupply.

Company Air Defense. The senior air defender for the company is the Avenger platoon leader or the Stinger team chief. He advises the company commander on the integration of the air defense assets and passive air defense. If an Avenger platoon is attached at the company level, the platoon leader locates his HMMWV within the company formation where he can best C2 his platoon. The Avenger platoon is integrated in the unit battle formation and monitors the company commander's net. Avenger can provide a 24-hour capability with the FLIR for night operations.

If the company receives a Stinger team, it provides air defense by integrating or over-matching the force. The Stinger crew chief and the company commander determine how best to employ the Stinger weapon system. Crew survivability considerations are critical, since the crew is vulnerable because it is in a thin-skinned vehicle.

Platoon Air Defense. Light armor platoon leaders must keep in mind the signature their tracked vehicles will produce. Tracked vehicles moving in a predominantly dismounted infantry AO produce a significant signature to aircraft. The platoon must maintain air guards and monitor higher headquarters nets for early warning of air attack, especially when on the

move. The platoon leader should designate a tracked vehicle to watch for enemy air. The platoon leader also coordinates small-arms air defense against hostile aircraft.

Section V. Engineer Support

The design of the division engineers in light divisions (light infantry, airborne, and air assault) provides them very limited ability to support light armor units. A light armor battalion task organized to a light division will normally require augmentation from corps engineers for the necessary mobility and survivability support.

The light armor battalion should be supported by a corps engineer company (airborne, light, wheeled, or mechanized), and a light armor company by a corps combat engineer platoon. The support a light armor platoon receives will depend on METT-T and the commander's intent.

A light armor battalion may possess assault bridging capability, and in-stride breaching capability for surface-laid mines and unexploded ordnance (UXO). Additional assault bridging and all tactical bridging support must come from the corps engineers. Corps engineers also possess mobility systems that can create vehicle lanes through minefields and complex obstacles. Two-tier fighting positions for light armor battalion vehicles will normally require corps engineer support, due to the limited amount of earthmoving assets in the light division engineer battalion.

ORGANIZATION, CHARACTERISTICS, AND CAPABILITIES

Light Division Engineer Battalion. A light division (light infantry, airborne, and air assault) is supported by an organic engineer battalion. The engineer battalion is designed to deploy rapidly during contingency operations by using lightweight equipment that can be airlanded or air dropped. Their primary mission is to provide combat engineer support to dismounted infantry units.

The organic light engineer battalion which supports a LID is the most austere type of division engineer battalion. Its engineer squads move on foot like the infantry units they support. The engineer equipment in the light engineer battalion consists of lightweight, high-speed bulldozers, and small emplacement excavators (SEE), and the Volcano scatterable mine system. The light engineer battalion may provide limited countermobility and survivability support to light armor units, but it is incapable of providing the necessary mobility support due to its lack of assault bridging and vehicle lane breaching systems. A detailed discussion of the light engineer battalion is contained in [Appendix B](#).

The organic airborne engineer battalion which supports the airborne division is more robust than a light engineer battalion. Its engineer squads have HMMWVs as squad vehicles to support the airborne infantry. The engineer equipment in the airborne engineer battalion consists of lightweight, high-speed bulldozers, scoop loaders, SEEs, and the Volcano scatterable mine system. They can provide the countermobility support, and limited mobility and survivability support to light armor units. The airborne engineer battalion lacks assault bridging and vehicle lane breaching systems needed to properly support light armor. A detailed discussion of the airborne engineer battalion is contained in [Appendix C](#).

The organic air assault engineer battalion which supports the air assault divisions is the most equipment intensive of the light engineer battalions. Its engineer squads have HMMWVs as squad vehicles to support the air assault infantry. The engineer equipment in the air assault engineer battalion consists of a combination of sling loadable bulldozers and lightweight, high-speed bulldozers, scoop loaders, SEEs, and the Volcano scatterable mine system. They can provide mobility and countermobility support, and limited survivability support to light armor units. The air assault engineer battalion does not have assault bridging

capability. A detailed discussion of the air assault engineer battalion is contained in [Appendix D](#).

The use of organic division engineers to support light armor units task organized to a light division must be carefully weighed against METT-T and the commander's intent. The combat engineer support task organized to light armor units will in turn deprive other elements in the light division of engineer support, due to the austerity of engineer equipment in the light division engineer battalion.

Corps Engineer Brigade. A light division engineer battalion is routinely augmented with engineers from the corps engineer brigade. This augmentation increases the capability of the engineers to provide mobility, countermobility, and survivability support, and sustains the force. The types of engineer units in the corps engineer brigade is primarily based on the types of divisions making up the corps.

Corps Combat Engineer Battalion (Airborne and Light). These corps engineer battalions are designed to deploy rapidly during CONOPS by using lightweight equipment that can be air dropped or airlanded. The primary difference between the corps airborne combat engineer battalion and the corps light combat engineer battalion is that the airborne battalion can air drop its equipment, while the light battalion must airland its equipment.

Both of these battalions are designed to augment the capabilities of the light division engineer battalion. They provide the capability to breach vehicles' lanes through minefield and wire obstacles using the mine clearing line charge (MICLIC), but lack assault bridging equipment. Countermobility effort is enhanced by additional engineer squads, Volcano scatterable mine systems, and earthmoving equipment. The survivability effort is increased by the additional earthmoving equipment in these two types of battalions. These battalions provide a limited sustainment engineering capability for the light divisions and the corps, before more robust heavy force engineer equipment can be deployed to the contingency area.

The corps airborne and the corps light combat engineer battalions use 5-ton dump trucks for engineer squad vehicles. The engineer earthmoving equipment consists of lightweight bulldozers, graders, scoop loaders, scrapers, and SEEs.

Corps Equipment Company (Airborne and Light). These corps engineer companies are designed to deploy rapidly during CONOPS by using lightweight equipment that can be airdropped or airlanded. The primary difference between the corps airborne equipment company and the corps light equipment company is that the airborne company can air drop its equipment, while the light company must airland its equipment.

Both of these equipment intensive companies are designed to augment the capabilities of the corps airborne and corps light combat engineer battalions. They are normally attached to a corps engineer battalion for C2, and logistics support.

The corps airborne and corps light equipment companies enhance the mobility, countermobility, survivability, and sustainment engineering efforts by providing additional horizontal earthmoving equipment for the light divisions and corps.

The corps airborne and corps light equipment companies' earthmoving equipment consists of lightweight bulldozers, graders, scrapers, and 5-ton dump trucks for hauling.

Corps Combat Engineer Battalion (Mechanized and Wheeled). These corps engineer battalions can support light or armored forces in the area of mobility, countermobility, and survivability. They are equipment intensive organizations that usually deploy by ship, but are capable of transport by air in special company or platoon packages.

The corps mechanized combat engineer battalion is designed to support armored forces. Its engineer squads are mounted in M13 APCs. Mobility support is provided by MICLICs, M-9 ACES, and CEVs. It is the only corps engineer organization that has AVLBs for assault bridging. Countermobility is provided by the Volcano scatterable mine system, engineer

squads, and the various blade systems (ACE, CEV, and SEE). Extensive survivability positions can be emplaced by the blades in this battalion.

The corps wheeled combat engineer battalion mounts its engineer squads in 5-ton dump trucks. Mobility support is provided by MICLICs, heavy bulldozers, and scoop loaders. Countermobility is provided by the Volcano scatterable mine system, engineer squads, and the various blade systems (bulldozer, scoop loader, and SEE). Extensive survivability positions can be emplaced by the blades in this battalion. The corps wheeled combat engineer battalion does not have any bridging capability. The battalion can perform limited sustainment engineering tasks in the light divisions and corps AO.

Corps Bridge Company (Ribbon and Medium Girder). The corps mechanized combat engineer battalion with its AVLBs is the only engineer unit that can support light armor units with assault bridging assets. The other bridging assets available from the corps engineers are ribbon bridge and medium girder bridge (MGB). The corps ribbon bridge and corps MGB companies are task organized to divisions based on METT-T and the corps commander's guidance.

Both of these bridging systems are designed to be emplaced out of the range of enemy direct fire and observed indirect fire. These bridges are normally emplaced as part of a division level operation.

EMPLOYMENT

Task Organization. Special attention must be placed on the task organization of combat engineers to support light armor units. The organic engineer battalion in the light division is normally incapable of providing the necessary engineer support to light armor in the areas of mobility and survivability.

The engineer battlefield assessment (EBA) in conjunction with the IPB is vital to identify engineer missions and recommend the task organization of light division and corps engineers to maximize combat engineer support. It is easy to over estimate the capabilities of the division light engineer battalion to support light armor units.

It is preferred to task organize engineer platoons and critical equipment assets between engineer companies, rather than move engineer companies between the light division's brigades and maneuver TFs. This approach minimizes the disturbance of habitual relationships between engineers and the supported maneuver unit, engineer and maneuver staff planning time, TF logistics system, and link-up coordination and time tables. An engineer unit should seldom be task organized below platoon level. An exception would be a reconnaissance mission, which requires an engineer platoon to delegate squads to scout platoons.

Corps engineer units will normally be task organized in a command relationship to a light division to support light armor units in the division for an offensive mission. Task organization will normally be a support relationship for a defensive mission. A corps combat engineer company should support a light armor battalion, and a corps combat engineer platoon should support a light armor company.

The type and number of corps engineer units available to support the light armor unit in a light division depend on a variety of factors peculiar to the contingency situation and geographical location.

The same CSS considerations used when task organizing light armor units to a light division apply for the corps engineer units that support light armor. A corps engineer unit will quickly overwhelm the CSS system in a light division unless additional assets are being provided from the corps support command (COSCOM) to the DISCOM in the light division.

COMMAND AND CONTROL

Corps engineer units task organized to a light division are normally under the control of the division engineer.

In a light division, the organic division engineer battalion forms a habitual association between its engineer companies and each infantry brigade. In turn, an engineer platoon leader is normally the TF engineer for each infantry battalion in the brigade.

If possible, do not alter this habitual relationship between the engineers and infantry when light armor is task organized to a light division. To minimize turbulence in the light division's TFs, the habitually associated division engineer platoon leader should remain the TF engineer, even after a light armor unit is task organized to his supported TF. The corps engineer unit, task organized to the light division to support the light armor unit, should assist the habitual TF engineer with his duties and responsibilities. For example, if a light armor company and a corps engineer platoon were task organized to a light infantry battalion, the corps engineer platoon leader would assist the habitually associated division engineer platoon leader in his duties as the TF engineer.

If the light armor battalion operates as a TF headquarters in the light division, the corps engineer company commander supporting the light armor battalion TF should be the TF engineer.

The augmenting corps engineer units can typically provide better C2 for the engineers in the supported TF than the light division engineers due to their greater number of long-range radios and command vehicles.

OPERATIONS

Engineers supporting light armor units can significantly enhance the combat power of light armor during offensive and defensive operations when properly integrated into the maneuver plan and tactical formations. Engineers provide diverse and flexible reconnaissance capabilities with mobility equal to that of light armor. They should assist light armor scouts in the R&S plan.

Mobility. Corps engineers augment the in-stride breaching capability against surface-laid mines and UXO that light armor units possess. Corps engineers provide additional capability to breach vehicle width lanes through minefield and complex obstacles, to include UXO. Corps mechanized combat engineers with AVLBs augment the assault bridging capability in the light armor battalion. Corps engineer mobility support provides light armor units enhanced freedom of maneuver, and permits more responsive logistical support of light armor units by trailing unit trains and CSS units. Light division engineers are incapable of providing the same level of mobility for light armor as corps engineers.

The extensive earthmoving capability of the corps engineer units not only provides the ability to reduce nonexplosive obstacles, but also facilitates the maneuver of light armor. The construction or repair of combat roads, trails, and ford sites by corps engineers may provide light armor and their CSS support packages with mobility between BPs or along axes of advance. During the early stages of a CONOP, corps engineers may construct or repair forward airfields or landing zones (LZ) for the deployment or sustainment of light armor units. Corps engineer units will often work with light division engineer units to execute these types of missions.

Countermobility. Corps engineers supporting light armor augment the countermobility capability of the light division engineers by providing additional engineer squads, vehicle mounted scatterable mine systems, and a more robust logistical capacity for the emplacement of obstacles. In addition to hand emplaced conventional mines and demolitions, engineers

possess a tremendous dynamic obstacle capability with their vehicle mounted scatterable mine systems. This capability allows the supported unit to emplace dynamic minefields faster, in greater numbers, and more accurately than artillery-delivered FASCAM minefield, without the corresponding loss of indirect FS.

The vehicle mounted scatterable mine systems may be employed in offensive operations to provide security to the flanks of attacking light armor, or to block potential counterattack routes against an armor or dismounted threat. In the defense, the scatterable mine systems augment hand emplaced conventional mine and demolition efforts. Scatterable minefield can be emplaced faster than conventional mines, with less manpower, with equal or better lethality than hand-emplaced conventional minefield. They are ideally suited for mobile defenses and retrograde operations in support of light armor.

Survivability. The robust earthmoving capability of corps engineer units provides light armor units with increased survivability on the battlefield. Corps engineer can provide light armor vehicles with doctrinal two-tier fighting positions, as well as protective positions for their combat trains and logistics support tail. Corps engineers normally augment the light division engineers in providing force protection for the light division's BSAs and C2 nodes.

Section VI. Nuclear, Biological, and Chemical Support

ORGANIZATION, CHARACTERISTICS, AND CAPABILITIES

Battalion Chemical Section. This section consists of the battalion chemical officer (lieutenant), a chemical operations NCO (staff sergeant; MOS 54B30), and an NBC specialist (MOS 54B10). Equipment in the section includes appropriate doctrinal manuals, map boards, overlays, work station, hazard templates, status charts, and lightweight decontamination system. The battalion chemical section's primary responsibility is to train first-line leaders and plan NBC operations.

The battalion chemical officer works as an assistant operations officer in the company operations section. The chemical officer and NCO are assigned by modified tables of organization and equipment (MTOE) to the headquarters company. Together, they form the NBC center at company level and are responsible for the technical aspect of operations as well as training, logistics, and readiness. The battalion chemical officer serves as the battalion commander's chief advisor on all NBC, smoke, and flame operations. He advises the battalion commander on the employment of smoke, decontamination, and NBC reconnaissance assets DS or attached to the battalion. He assists in the coordinating of logistical requirements for these units. He informs the battalion commander on all threat NBC capabilities and ensures they are reflected on all plans and OPORDs. He assists the S4 in the acquisition of all NBC defense equipment and the forward pre-positioning of decontaminates and fog oil. He prepares and plots the locations of NBC hazards and advises the commander on the appropriate defense measure requirements. He provides assistance to subordinate commanders on NBC, smoke, and flame operations.

Assignment of the chemical specialist and lightweight decontamination system authorization gives the battalion hasty decontamination capability. The battalion chemical officer and NCO supervise and train battalion decontamination operations.

Company NBC Section. The NBC section at company team level consists of one chemical operations specialist (MOS 54B20) and one additional-duty officer and enlisted alternate (branch immaterial). Equipment includes appropriate doctrinal manuals, map boards, overlays, work station, hazard templates, and status charts.

The assigned chemical specialist works in company operations, where he is immediately available to the company commander as the primary advisor for all NBC matters. Like their counterparts in higher echelons, chemical personnel at company level are responsible for

training first-line leaders and monitoring other NBC training. They are the focal point for all NBC actions in garrison and in the field.

The company chemical operations specialist is instrumental in the planning cycle of all tactical operations. He provides assistance to the commander by evaluating information received in NBC warning and reporting system (NBCWRS) reports. He plans decontamination, smoke, flame, and NBC reconnaissance operations and supervises their execution. While maintaining status charts for MOPP levels and radiation exposure, the chemical NCO also plans for future operations. The company chemical NCO may be positioned anywhere on the battlefield the commander directs. To ensure timely and accurate battlefield assessment, the commander positions the chemical NCO according to the principles of accessibility and immediacy.

EMPLOYMENT AND OPERATIONS

Battalion Operations. During tactical operations, battalion chemical personnel provide 24-hour NBC operations capability. A work station is designated in the TOC where chemical information is processed and disseminated. The chemical officer is available to cover shift changes within the TOC and provide chemical continuity for tactical operations. This allows the chemical officer to coordinate and, when operations permit, physically supervise battalion decontamination, smoke, and NBC survey/chemical reconnaissance operations.

Battalion chemical personnel are instrumental in the planning cycle of all tactical operations. They provide assistance to the battalion intelligence officer in the IPB process, develop NBC support for COAs based on the commander's intent, and integrate chemical and smoke operations based on the OPORD. Once the plan is developed, they ensure successful execution.

The duties and responsibilities of chemical personnel in the battalion TOC are listed in the following paragraphs. These are not all-inclusive and are manipulated to meet changing situations. In addition to these specific chemical duties, chemical officers and NCOs also perform a myriad of operational duties according to their abilities and unit needs.

Intelligence. Receive, relay, and disseminate NBC information; recommend NBC reconnaissance employment; provide NBC threat briefings.

Personnel. Ensure proper employment and professional development of chemical personnel; coordinate proper use of chemical company assets; coordinate with S1 on chemical casualty evacuation.

Training. Coordinate and monitor training; integrate battle tasks in NBC environment; evaluate individual and collective battle tasks; understand battle focus process and take active role in planning.

Evaluation. Conduct individual and collective proficiency testing; analyze and report results; and develop solutions to correct deficiencies.

Readiness. Report equipment status; determine authorization shortfalls; assist S4 with NBC stocks and resupply; monitor contingency stocks.

Logistics. Account for NBC expenditures; follow up requisitions and maintenance; match requisitions to authorizations; conduct inspections.

Tactical Operations. Execute NBC warning and reporting system; maintain current operations overlay; post all NBC attacks; post offensive NBC targets; coordinate with S4 regarding MSR; work closely with S2; maintain radiation exposure data; recommend MOPP levels; recommend chemical asset employment; develop obscuration plan; participate in planning cycle from IPB through execution; develop and execute hasty decontamination operations; coordinate operations with the battalion medical section and FSB medical company through the combat trains CP; coordinate operations of supporting chemical units

with the battalion S3, brigade NBC section, and chemical units and conducts nuclear and chemical vulnerability analysis.

Company Operations. The duties and responsibilities of chemical personnel in the company CP are listed in the following paragraphs. These are not all-inclusive and are manipulated to meet changing situations. In addition to these specific chemical duties, additional duties may be assigned by the commander.

Intelligence. Analyze NBC threat; operate NBCWRS; coordinate NBC reconnaissance assets; brief all new personnel on NBC threat.

Training. Determine need for and provide technical training to first-line supervisor; plan and coordinate conduct of NBC battle focus; monitor and evaluate status of training.

Evaluation. Conduct evaluation of NBC proficiency at individual and collective levels.

Readiness. Maintain status reports; consolidate and provide data to commander and 1SG; assist supply sergeant with NBC stocks and resupply; monitor contingency stocks.

Logistics. Account for NBC expenditures; follow up requisition and maintenance; balance equipment on hand and requisition additional equipment; monitor crew maintenance; ensure radiac instruments are calibrated.

Administration. Operate a company NBC room.

Tactical Operations. Execute the NBCWRS; maintain current operations overlay; post NBC attack overlay; maintain decontamination overlay; supervise use of NBC equipment; conduct hasty decontamination operations; supervise NBC surveys; post NBC unit symbols; maintain radiation status charts; recommend MOPP levels; recommend employment of chemical assets; and participate in planning operations.